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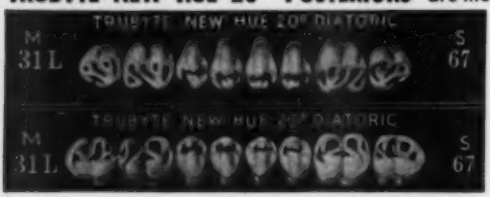

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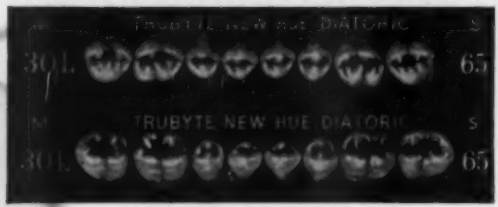

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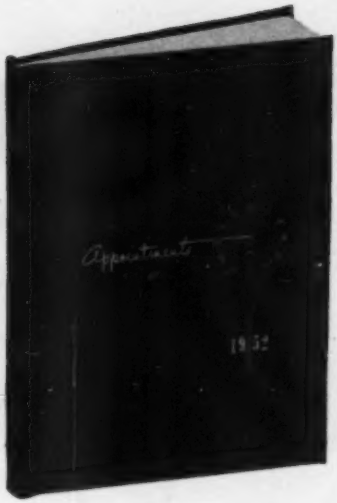

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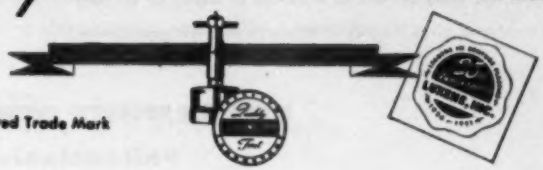

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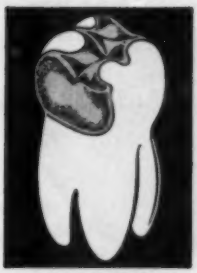

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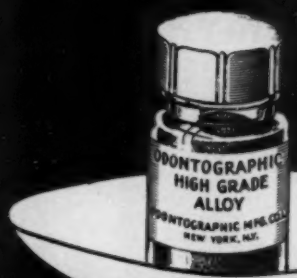

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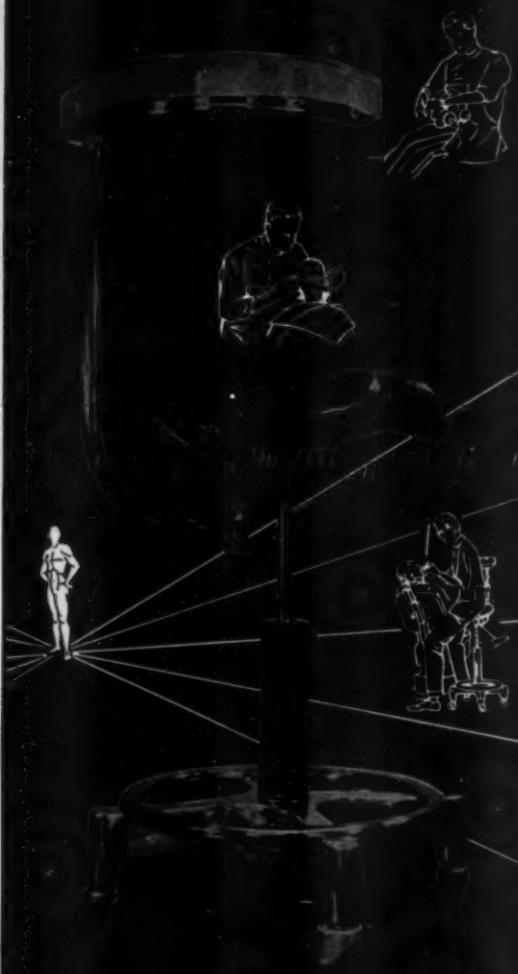

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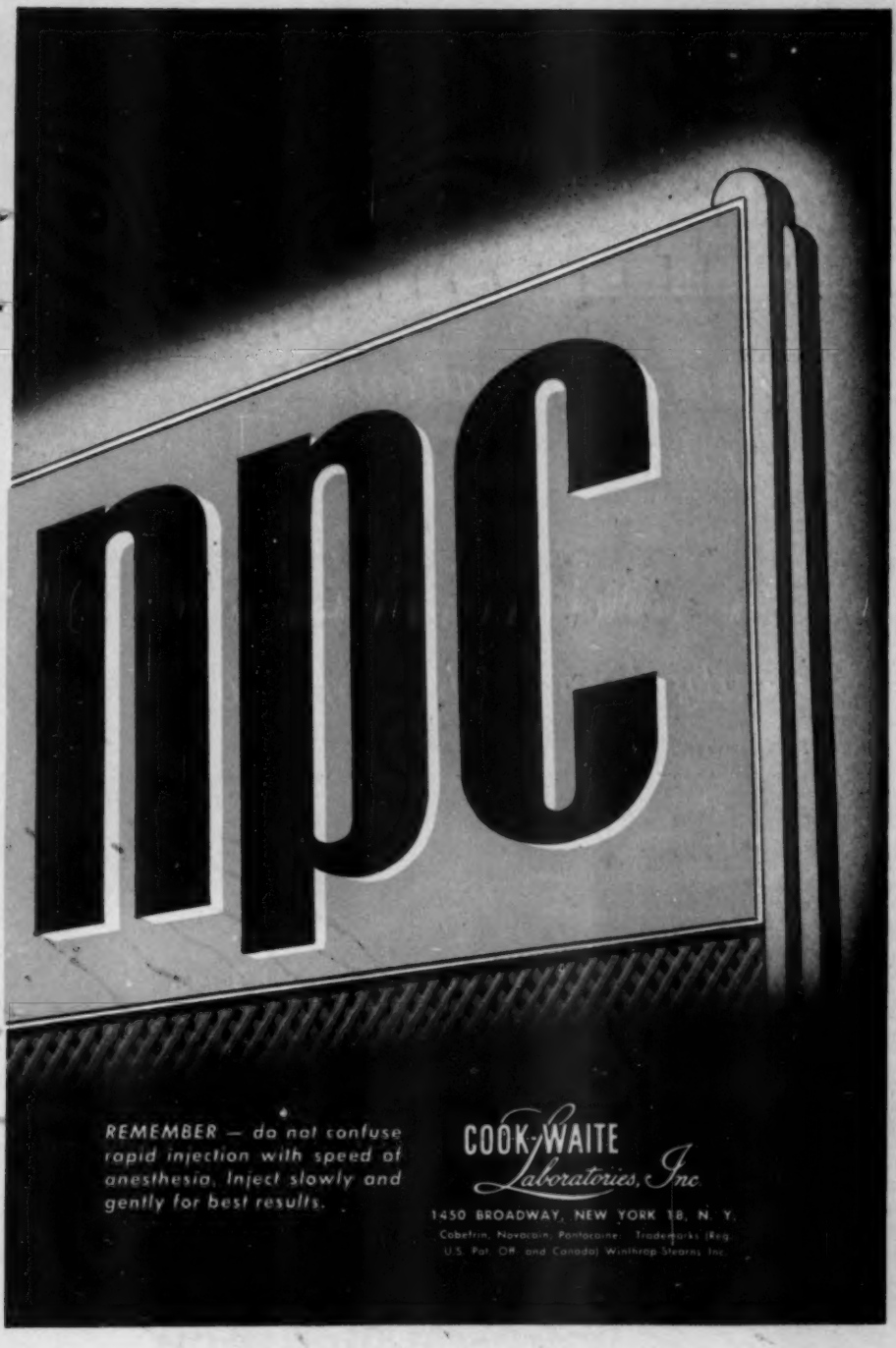
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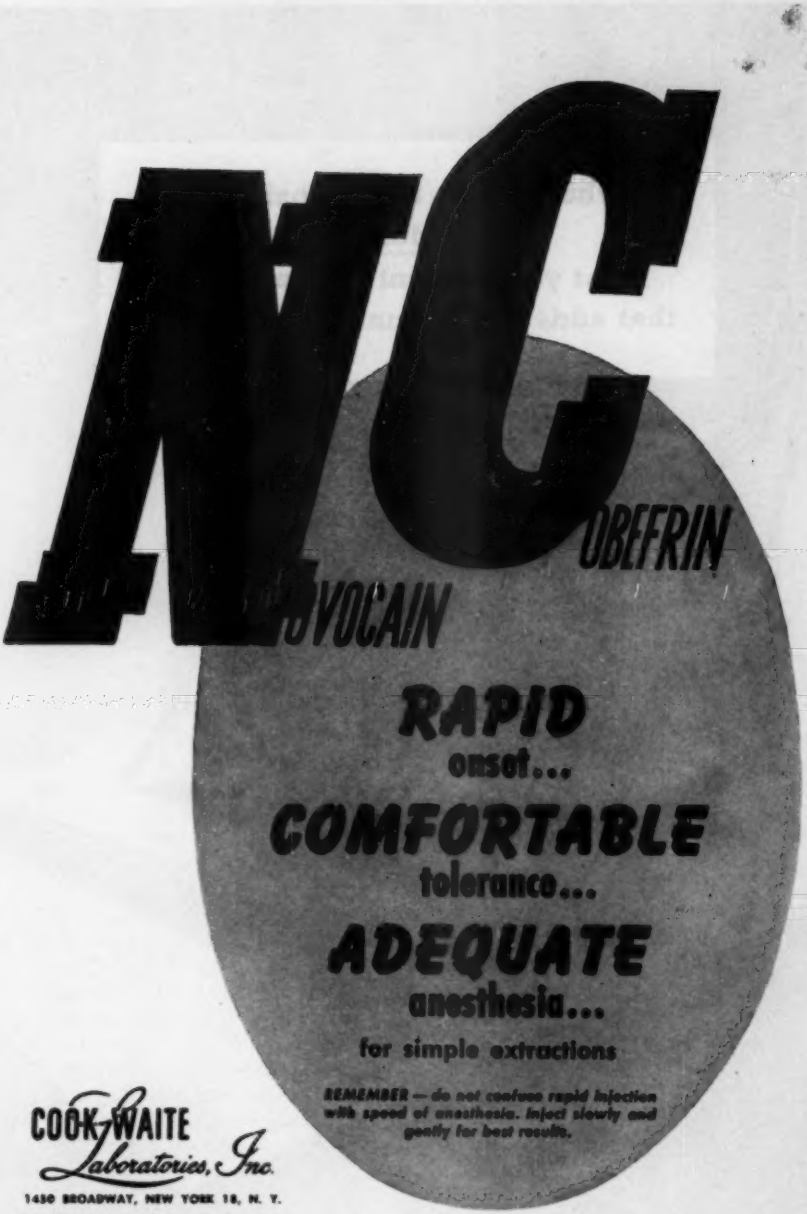

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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Factors influencing the accuracy of reversible hydrocolloid impressions

Ralph W. Phillips, B.S., and Ben Y. Ito,† Indianapolis*

The use of reversible hydrocolloid in restorative dentistry has received increasing acclaim since its introduction for this purpose by Sears in 1937.[1] Unfortunately, on many occasions the results obtained by different individuals, when employing what was believed to be identical technics, have been contradictory. Although variation in different brands and batches of hydrocolloid may account for some of the discrepancies, most of the difficulties can be attributed to the influence of the many manipulative variables involved. Reversible hydrocolloid is unsurpassed as an impression material, but, as with all dental materials, it requires careful adherence to many fundamentals. Until all of these variables have been standardized into a universally accepted procedure, more confusion will undoubtedly arise.

Unfortunately, many of the factors involved in the use of hydrocolloid have not as yet been scientifically studied. The careful work of Paffenbarger,[2] Kern,[3] Skinner,[4,5] James,[6] Thompson[7] and others has been invaluable to a more complete understanding of the basic behavior of reversible hydrocolloid and the influence of certain variables. In a com-

Presented before the Committee to Investigate Elastic Impression Materials, Chicago, February 2, 1951.

This research was supported by a grant from the Veterans Administration.

*Associate professor of dental materials, Indiana University School of Dentistry.

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1. Sears, A. W. Hydrocolloid technique for inlays and fixed bridges. D. Digest 43:230 (May) 1937.

2. Paffenbarger, G. C. Hydrocolloid impression materials: physical properties and a specification. J.A.D.A. 27:373 (March) 1940.

3. Kern, W. R. A study of certain physical properties of colloidal impression materials. Master's thesis, Northwestern Univ., June, 1936.

4. Skinner, E. W., and Kern, W. R. Colloidal impression materials. J.A.D.A. & D. Cosmos 25:578 (April) 1938.

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6. James, A. G. Maintenance of equilibrium on reversible hydrocolloid impressions. I. Made with stock impression materials. J. D. Res. 28:108 (April) 1949; II. Made with material supplied by the manufacturers for testing. 28:119 (April) 1949; III. A report on tests made with five stock impression materials. 28:447 (Oct.) 1949.

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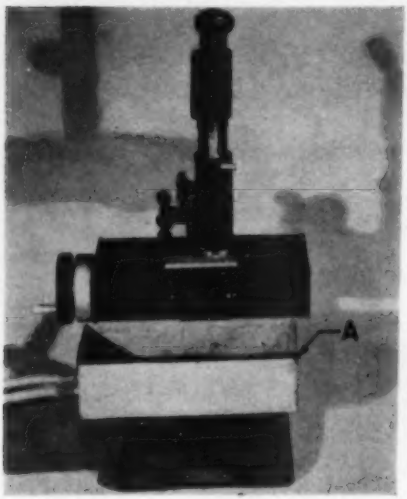

Fig. 1 • Micrometer comparator microscope used for measuring dimensional change. Pan (A) holds the impression tray and contains the various storage media

prehensive review, Mann[8] has ably surveyed these papers. Although some of these studies have made use of critical dies as the principal method of evaluation, most of the actual technical measurements of dimensional change have been made by means of the comparator microscope. Triangular impressions of hydrocolloid, 330 mm. in length, poured into an open trough were used in these investigations. Data from these investigations have led to the establishment of certain fundamentals, but there are some shortcomings to this particular testing procedure.

The dimensional change of the specimens is influenced by such experimental factors as the type of liner used in the trough and whether or not sliding blocks are inserted at the ends of the specimens. In preliminary tests where these, and other, variables were studied, results indicated that many factors would influence the data obtained, and it seemed difficult to determine exactly which set of conditions would most closely approach the clinical use of the material. Results obtained on solid specimens 330 mm. in length give valuable information concerning the general behavior of hydrocolloid but can be misleading when an attempt is made to interpret these data into what is actually occurring around a tooth preparation that is confined in a small water-cooled impression tray. For example, if the hydrocolloid is stored in water after removal from the mouth, expansion on a long, solid specimen could lead to the conclusion that the impression of the teeth would become larger. Actually, however, when the hydrocolloid is confined in a closed tray, the material might be forced inward, thus making the mold itself smaller. Therefore, it was felt that another test method might be better used for measuring the dimensional change as it is influenced by certain manipulative variables. This method involved the use of an actual dental impression tray with measurements being made across a typical impression. These measurements would then be correlated with practical dies poured in impressions treated in a similar manner.

PROCEDURE

A Gaertner micrometer slide comparator microscope (Fig. 1) was used in this study. By means of a traveling objective and eyepiece moving along a scale calibrated to 0.001 mm., measurements can be made on small specimens. The microscope is focused on a small marker on one side of the impression, a reading taken, and then rapidly but smoothly the objective is moved along the carriage to focus on a marker on the other side of the impression. The difference in the two readings then serves as the length of the

8. Mann, A. W. Hydrocolloid technique. Fort. Rev. Chicago D. Soc. 20:16 (July 15) 1950.

measured area and any subsequent change in the impression can be accurately detected.

The metal pan (A) which holds the impression tray is shown in Figure 1. This pan was used for containing the various storage media so that the dimensional change of the hydrocolloid could be observed during the immersion period. A felt-lined glass top was made to fit on the top of this pan so that a relative humidity of approximately 100 per cent could be maintained, if desired. In these tests, in order to prevent water condensation, a detergent was placed on the bottom side of the glass top.

A Superior water-cooled, lower impression tray was used in this study and it was securely fastened to the bottom of the pan. There are other types of impression trays employed clinically which have a different size, shape, and cooling arrangement and no doubt these factors affect the dimensional change. Such variables require additional study but in order to eliminate them from this investigation only one type of tray was employed. Both ends of the tray were blocked with compound, a technic generally employed with sectional impressions. Compound or wax confines the hydrocolloid and assists in proper positioning of the tray.[1,9] Figure 2, left, shows a typical impression in this tray with metal markers (A) in place on either side of the mold. Fine cross hairs were placed on each marker. Generally, these markers were set in position immediately after gelation of the hydrocolloid and before removal of the die. The die which was used in taking the impression was a porcelain tooth prepared as a full cast crown. A diagram of this die is shown in Figure 2, right. This particular design was used so that, if desired, markers could also be placed on the shoulder of the preparation in order to measure the change within the impression as well as on the top surface. The undercut in the cervical area was 4.5 degrees. The use of tapered dies will be discussed in a later section of this article. The die was always submerged in the hydrocolloid to the depth indicated by the wavy line.

Each brand of material was handled exactly according to the manufacturers' directions in regard to boiling time, mixing in the syringe, and tempering procedure. A Hanau hydrocolloid conditioner was used throughout this study and the temperature of all baths was checked daily.

The tray was filled with freshly prepared hydrocolloid and the porcelain die

9. Buchmann, W. A. Use of hydrocolloids in inlay and bridge prosthesis. Fort. Rev. Chicago D. Soc. 16:7 (Nov. 15) 1948.

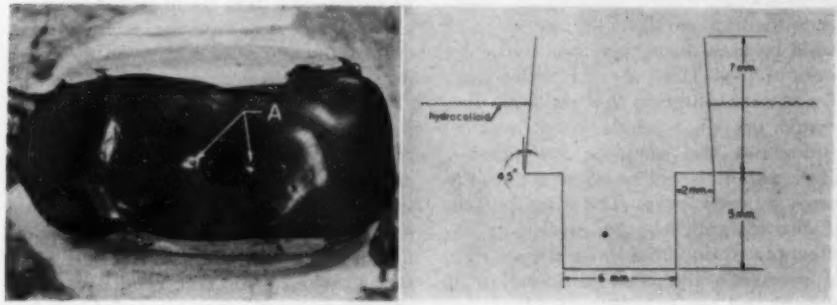

Fig. 2 • Left: Typical impression with markers (A) on each side of the mold. Right: Diagram of porcelain die used in this study

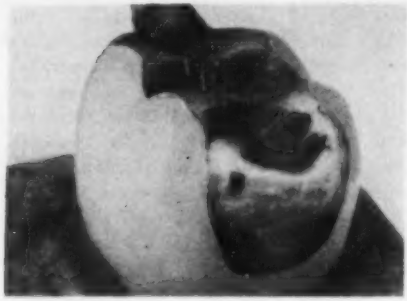

Fig. 3 • Master casting on porcelain die. The fit of this casting to the stone dies was criterion for accuracy

inserted. This die had previously been held in a humidor at a temperature of 98.6°F. in order that it would be at mouth temperature on insertion. The bottom of the pan was covered with water so that with the glass top in place the hydrocolloid could be held at approximately 100 per cent humidity, thus approximating mouth conditions during gelation. The tray was cooled with tap water (60° to 75° F.) for an arbitrarily selected period of 10 minutes before the die was removed.

The following five representative commercial hydrocolloid materials were used in this study: Deelastic, Dentocoll, Kerr, S. S. White Elastic Colloid and D-P. All were purchased on the open market. Large enough quantities of hydrocolloids were secured so that the same batch could be used during any one particular series of tests. However, the entire study was of such duration that shelf life prevented use of a single batch number throughout the complete investigation. These materials will be referred to in this paper by code letters. The main purpose of the research was to investigate the effect of certain variables on the accuracy of reversible hydrocolloid materials in general and not to point out advantages of any particular brand. Such comparisons must always be tempered by the fact that hydrocolloid varies from batch to batch and that other objective handling characteristics not here studied should be taken into consideration.

In order to correlate these scientific measurements more closely with the clinical application of the material, a group of four different preparations was made in porcelain teeth and these teeth were then used as experimental dies. Cavity preparations were made in the biscuit bake so that only a slight finishing of margins was necessary following the final bake. Since it was the most critical, a large MOD preparation was the one used. Results obtained on this die were representative of those secured with the other preparations.

The method for determining the accuracy of impressions made of these preparations was identical to that employed by James.[6] A hard gold casting which under 15X magnification had no visible inaccuracies was made for the porcelain tooth preparation. The fit of this casting to the stone dies made from hydrocolloid impressions taken of the porcelain tooth was then the criterion for accuracy. Any misfit of the casting would indicate that the stone die was not an exact reproduction of the porcelain tooth preparation. The master casting on the porcelain tooth preparation can be seen in Figure 3. This particular technic eliminates the variables involved in casting and permits more rapid progress than could be obtained by making a new casting for each die and then trying this casting back on the original porcelain preparation.

When tests were made with these practical dies, the hydrocolloid was again handled according to the manufacturers' directions. The preparation and entire tooth, held at 98.6°F., was covered with hydrocolloid which had been stored at the specified temperature. A small Kerr syringe with an 18 gage needle was employed. Since the first material coming from the syringe is often diluted with water, approximately one inch of hydro-

colloid was extruded away from the tooth. The covered tooth was then immediately inserted into the tray which had been filled with hydrocolloid, tempered at the temperature and for the length of time directed by the manufacturer. During the ten minute cooling period before the die was removed, the tray was maintained in an atmosphere of approximately 100 per cent humidity and at 98.6°F.

In making the stone dies, the powder was always weighed and the water measured by a pipet so that the setting expansion of the stone would be uniform. One stone, Duroc,[10] was used throughout. The setting expansion of this stone is 0.05 per cent. It was necessary on occasion to alter the water-powder ratio slightly from one batch of stone to another. Control dies and tests were routinely made to make sure that the setting expansion was constant. Although accurate dies could be obtained for each of the five hydrocolloids tested with this stone, it was necessary to vary the ratio slightly for some hydrocolloids. The fact that the water-powder ratio affects the clinical fit of the die has been observed also by Wooster.[11]

The stone was mixed for exactly one minute and then mechanically vibrated into the impression. During the set of the stone, the impression was placed in a humidor at 100 per cent humidity for a minimum period of 30 minutes. After separation, the dies were allowed to harden for at least 24 hours before the casting was tried on. On no occasion was the casting forced into place but only moderate finger pressure was employed. All dies were studied under a binocular microscope (15X) for any discrepancies. This is a critical test but since the success of the final restoration is dependent on the sum total of many individual variables, even slight inaccuracies, which sometimes may require a microscope to detect, are of definite clinical significance. Many of the discrepancies were visually evident and some examples are shown in this article. When accurate dies were secured, the casting would slip easily, but snugly, into place with no evidence of open or raised margins when examined under low power magnification. Such dies are the aim of any impression technic.

All of the dimensional change measurements shown here are the average of at least four individual tests, while the results depicted on the stone dies are representative of those obtained on over 3,500. Eight or more dies were made for each particular set of conditions.

It was felt that this correlation of scientific measurements in the actual impression tray with practical dies poured in similarly treated impressions would shed light in regard to the effect of certain variables involved in the use of reversible hydrocolloid.

Storage of the Impression • Previous laboratory studies have demonstrated the behavior of reversible hydrocolloid when stored in various media for prolonged periods of time.[2-5] These dimensional change measurements, however, were made on solid triangular specimens poured into a metal trough. Thus in order to determine what actually happens in the impression tray, it was felt that much of this work could well be repeated employing the technic described.

When measuring the change across an actual impression, the direction of movement of the hydrocolloid is dependent to a great degree on whether the material is being held tenaciously by the sides and ends of the impression tray. For example, if the hydrocolloid is stored in air and by syneresis continues to lose water, it will contract. If during this time the material is held tightly to the tray by perforations, overhang of material, or any undercuts in the tray, then the result will most likely be a shrinking of the hydrocol-

10. Manufactured by Ransom & Randolph Company.
11. Wooster, H. L. Personal communication.

loid toward the tray, thus leaving the actual mold larger. If, however, the material is not bound to the tray, it will be free to shrink inward and produce a smaller mold. James was aware of this fact and employed a specially prepared perforated tray.[6] Since in this study it was desirable to use a typical dental water-cooled tray, this factor had to be taken into consideration or the results might have been confusing from test to test. The Superior tray has a rolled edge in order to prevent dislodgment of the hydrocolloid on its removal from the mouth. In addition, the hydrocolloid was allowed to overhang the edges of the tray and thus prevent any pulling away. Retention was also provided in the compound blocking the ends. Throughout this investigation, then, the hydrocolloid was held firmly by the tray. In the few cases where the hydrocolloid obviously contracted away from the tray in one area, the tests were discarded.

The storage environments used were air, 100 per cent humidity, tap water and 2 per cent potassium sulfate. The relative humidity of the laboratory when specimens were stored in air ranged from 35 to 50 per cent. Dimensional change readings were taken at 30 minutes, one, two, and three hours from the time that the die was removed. All results are expressed in terms of the actual change in millimeters across the mold. Therefore, expansion on the graphs means that the mold itself is larger, through contraction of the material between the mold and tray, while contraction indicates a smaller mold through expansion of the material between mold and tray.

Data for the five hydrocolloids are summarized in Figures 4 through 8. It can be seen from these graphs that none of the hydrocolloids is stable in any media. All show some change in the various environments even after only 30 minutes of storage. Thus these data compare favorably with previous research by Skinner and Kern who point out that some change occurs regardless of the storage

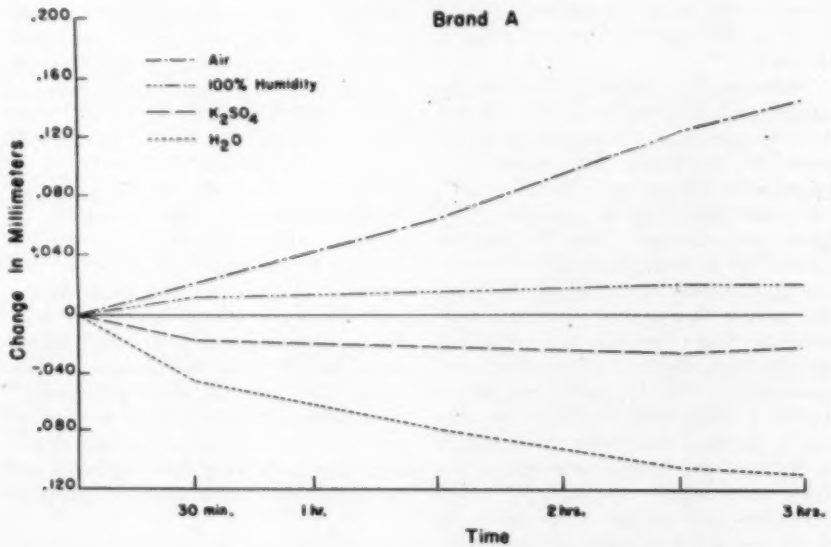

Fig. 4 • Dimensional change of brand A in various media

media.[4] It is interesting to note that the best medium varies with each particular brand of hydrocolloid. For example, the least change for hydrocolloids B and E was in an environment of 100 per cent humidity while C was most stable in potassium sulfate. The dimensional change of A was approximately the same in either potassium sulfate or 100 per cent humidity. Skinner and Pomes have pointed out that 100 per cent humidity generally is the safest storage medium for alginate impression materials[12] and these data indicate it probably is the best for most reversible hydrocolloids. However, the best medium may vary for each hydrocolloid or possibly even from batch to batch of the same brand.

It is obvious from these graphs that storage of any hydrocolloid in air leads to excessive distortion. The other environments tend to produce some type of equilibrium with the water in the hydrocolloid and thus reduce the dimensional change. A study of these graphs also corroborates the observation of James[6] that some hydrocolloids may expand while others contract in the same medium. Brands A, B and C all showed a contraction of the hydrocolloid, and thus an expanded mold, when stored in 100 per cent humidity while D and E exhibited a slightly smaller mold at the end of three hours in the same environment. Likewise, A, B and C all produced a smaller mold when stored in potassium sulfate, but D and E contracted slightly, making a larger mold.

The only hydrocolloid containing fibers was D and it exhibited the least dimensional change during storage. This observation was originally reported by Gehring.[13] The effect of fibers in stabilizing the impression needs further study.

12. Skinner, E. W., and Pomes, C. E. Dimensional stability of alginate impression materials. J.A.D.A. 33:1253 (Oct.) 1946.

13. Gehring, R. W. A study of the duplicating and characteristic properties of hydrocolloid impression materials. A thesis, University of Michigan School of Dentistry, May, 1949.

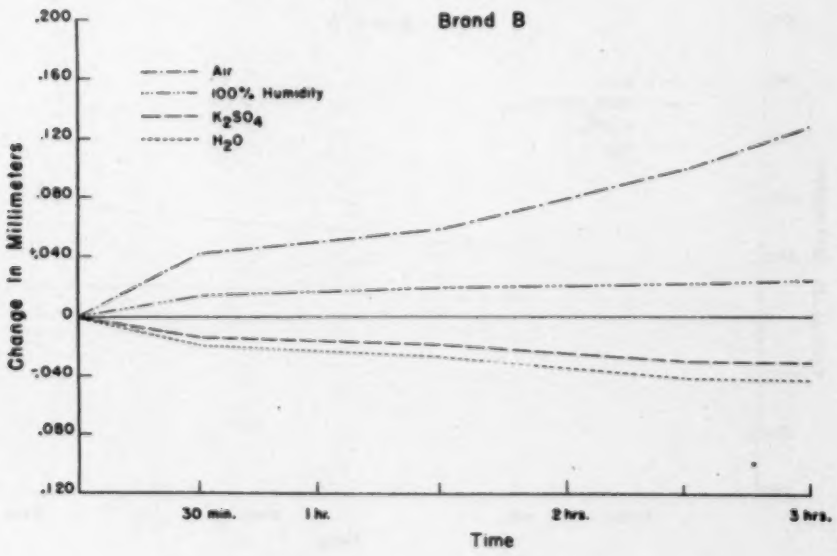

Fig. 5 • Dimensional change of brand B in various media

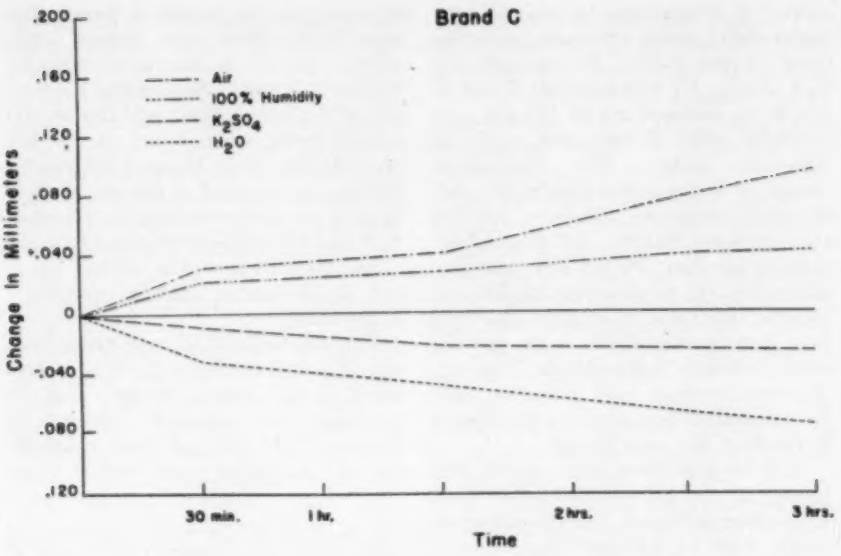

Fig. 6 • Dimensional change of brand C in various media

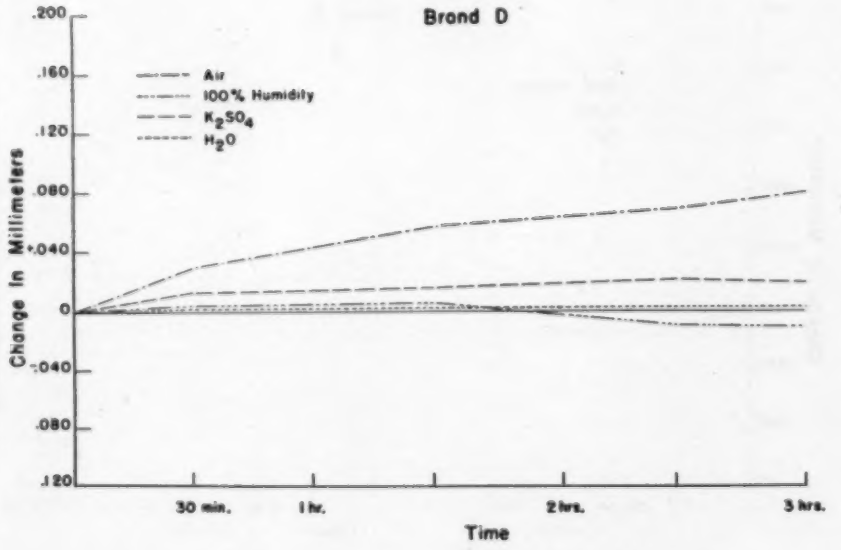

Fig. 7 • Dimensional change of brand D in various media

The tests were not carried beyond three hours since this is the maximum time that data could be secured on the specimens stored in air. Dehydration became so great at this time that the hydrocolloid would crack or pull away from the tray and thus end accurate measurements. The data indicate that the dimensional change when the hydrocolloid was stored in 100 per cent humidity or potassium sulfate was leveling off at this point, but it is possible that the curves might come back closer to the base line as time progressed. However, since storage of even three hours is generally not indicated, except for academic purposes, there seemed to be no need for data beyond this point. Practical dies were made in impressions which had been stored for as long as 24 hours.

The degree of dimensional change with some of the hydrocolloids when stored in either 100 per cent humidity or potassium sulfate is not great. The amount of dimensional change permissible is, of course, not known and it might even be argued that the dimensional change in some instances is so slight that it would not be of practical significance. Dies run on impressions stored for various periods of time in the different media show, however, that even after only 30 minutes of storage the dimensional change is sufficient to produce a definitely inaccurate die. Examples of dies poured from one hydrocolloid stored in different media can be seen in Figures 9 and 10. As explained previously, the casting is the control and any discrepancy in the impression can be detected by the fit of the stone die to this casting. A stone die poured immediately after removal of the porcelain preparation is shown in Figure 11, left. Compared with this die, all of those which were stored are inaccurate.

It was found that dies poured at the end of 15 minutes seldom showed any distortion and a few of those stored for 30 minutes were accurate. However, the frequency of distortion at 30 minutes,

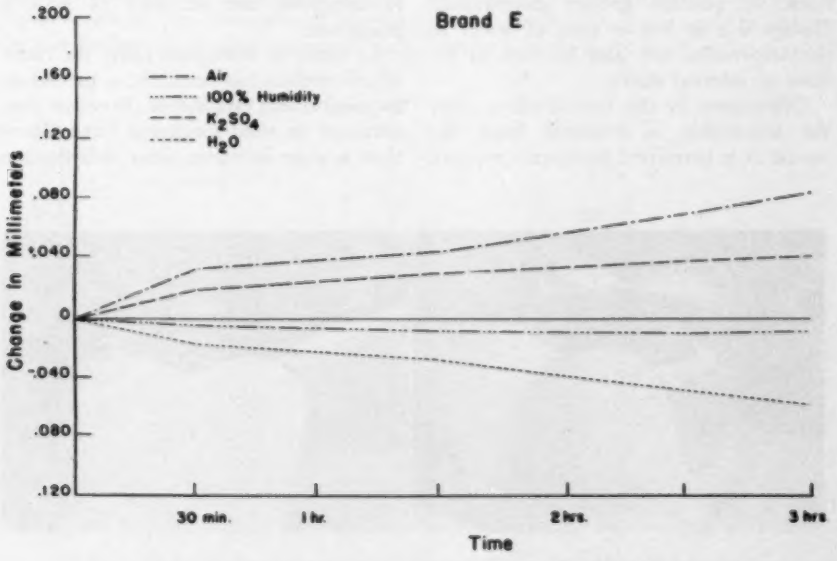

Fig. 8 • Dimensional change of brand E in various media

Fig. 9 • Left: Die poured from impression stored 30 minutes in tap water. Right: Die poured from impression stored 30 minutes in 100 per cent humidity

some examples of which are seen here, indicates the risk involved by storage in any media for that length of time. Storage for longer periods of time generally increased the distortion slightly, as shown by the die in Figure 11, right. This die was poured from an impression stored for 24 hours in tap water. Distortion increases with storage time, not only because of possible greater dimensional change due to loss or gain of water in the impression but also because of release of internal strain.

Oftentimes in the dental office after the impression is removed from the mouth it is permitted to remain exposed to air for an indefinite period of time. In order to compensate for the shrinkage due to syneresis, the impression is placed back in water before pouring. Although many writers have cautioned against such a technic, it is still believed by some that the hydrocolloid will imbibe water and thus expand back to its original dimensions. The following tests were made to determine the accuracy of such a procedure.

In order to determine fairly the merit of this technic, as scientific a procedure as possible was established. Previous data obtained on solid specimens have shown that storage in water after dehydration

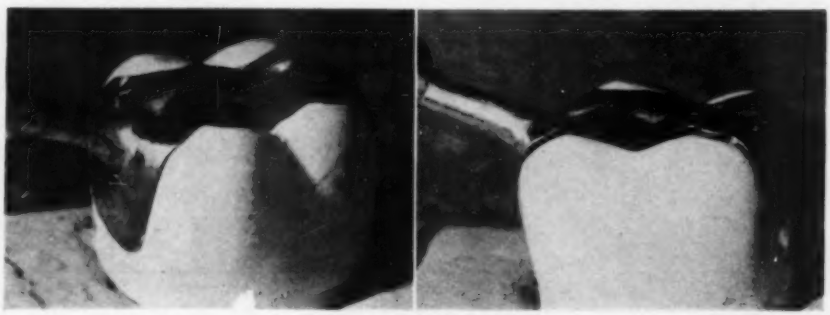

Fig. 10 • Left: Die poured from impression stored 30 minutes in 2 per cent potassium sulfate. Right: Die poured from impression stored 30 minutes in air

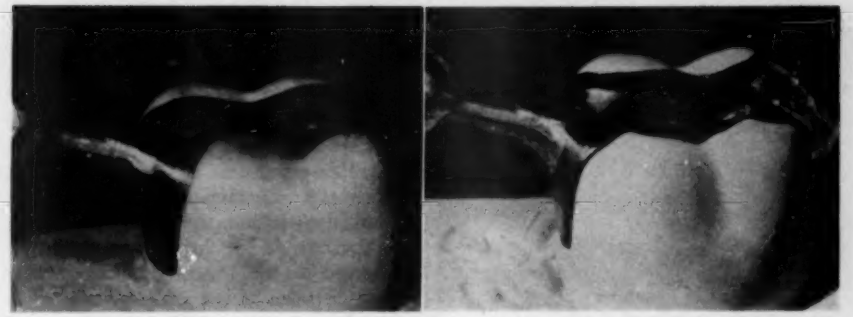

Fig. 11 • Left: Die poured immediately. Right: Die poured from impression stored 24 hours in tap water

will produce an expansion of the hydrocolloid beyond its original dimensions.[4,5] Theoretically then, for best results the impression should be stored in water only long enough for the expansion to balance the contraction. This length of time would probably vary for each brand of hydrocolloid and for the dehydration period employed. In order to determine what the theoretically ideal water storage time would be, the dimensional change in two hydrocolloids was measured and the results are shown in Figure 12. The hydrocolloid impression was allowed to stand in air for 30 minutes and the contraction (which resulted in a larger mold) is shown. At that point, indicated by the solid vertical line, the hydrocolloid was covered with tap water and readings taken until the subsequent imbibition of water and expansion had equaled the contraction caused from the dehydration in air. For B, only seven minutes of storage in water was required while in A, 10

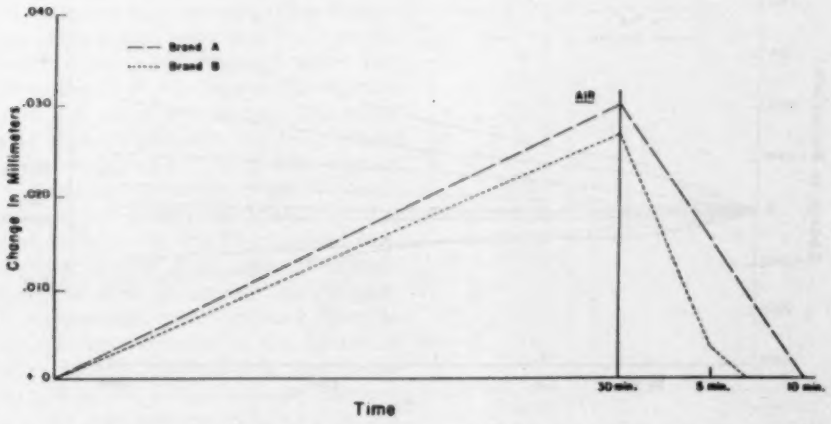

Fig. 12 • Dimensional change in two hydrocolloids when stored 30 minutes in air and then immersed in water

Fig. 13 • Die poured from an impression stored 30 minutes in air and then 10 minutes in tap water

minutes was necessary. Supposedly, at this point the expansion of the material in water had exactly balanced the contraction in air and the size of the actual mold would be back to the original dimensions. These, then, were the time elements employed for the practical dies—30 minutes in air, followed by the exact indicated immersion time in water before pouring.

A die, representative of many, poured from an impression of hydrocolloid A treated in this manner is shown in Figure 13. The inaccuracy is evident. There are several reasons why such results might be expected. Although the test data showed that the expansion in millimeters balanced the contraction, these measurements do not indicate whether the expansion would be in exactly the same direction as the contraction. In such a mold, because of the various stresses involved during the chilling and removal of the impression, one would not expect the material to expand back in the same magnitude or direction in all planes. Thus the impression would be distorted. The following tests indicated the variation that occurs in different areas of the mold even when the impression is stored in a constant environment.

Figure 14 shows the dimensional change in hydrocolloid E when stored in the various media. In this series, the dimensional change was measured not only as previously on the top of the impression (corresponding to the cervical of the

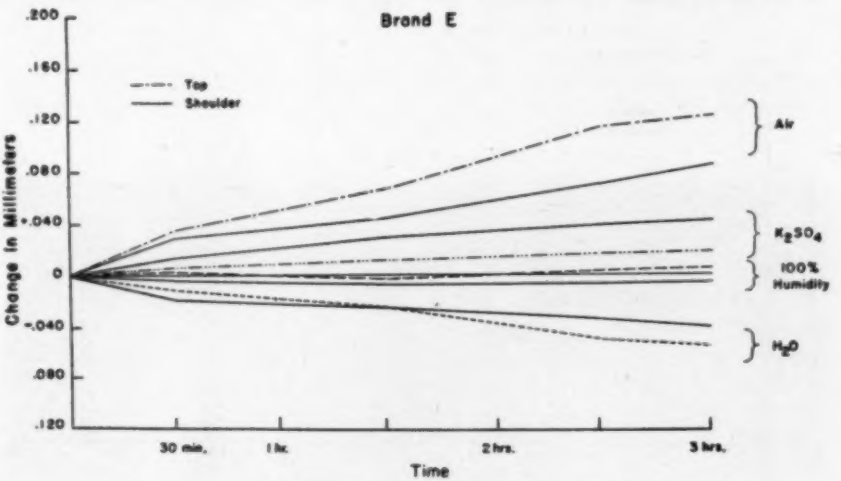

Fig. 14 • Dimensional change in one hydrocolloid when stored in various media. Readings were taken both at the shoulder and top of the mold

tooth) but also on the shoulder of the porcelain preparation. It can be seen that although the dimensional change follows the same trend whether measured at the shoulder or top, the actual degree of change varies in the two areas. For example, at the shoulder of the mold the expansion after three hours' storage in potassium sulfate was 0.043 mm. but only 0.018 mm. at the top. Thus, as would be expected, because of differences in bulk of material and the degree of strain present, expansion or contraction is not uniform throughout the mold and it is not possible to balance the contraction due to syneresis by a subsequent immersion in water.

Distortion Upon Removal • Although reversible hydrocolloid is a relatively elastic material, some permanent deformation undoubtedly occurs during removal of the impression from the mouth. Various factors influence the degree of distortion and the purpose of the following tests was to determine the effect of certain of these variables which are involved in this step of the hydrocolloid technic.

Paffenbarger has shown that the accuracy of reproduction was directly related to the degree of undercut.[2] Figure 15 verifies this observation. Two different preparations were employed in the test, the one previously used which had an undercut of 4.5 degrees and another with a taper of 2.5 degrees. The metal markers were placed in the hydrocolloid on either side of the die and an original reading taken at the end of the 10 minute gelation period with the die still in place. The porcelain die was then removed with a quick vertical snap, and the dimensional change measured immediately. Four tests were made for each die and there is some variation in the individual measurements. This could be anticipated because of the human variable involved and the complex strains present in the hydrocolloid. When the undercut preparation was used, the average distortion was more than twice that of the tapered die. As Paffenbarger has pointed out, when no undercuts are present there is some slight distortion but reproduction is within 0.05 to 0.10 per cent.[2] The main practical significance of these tests is to re-emphasize the importance of avoiding any undercut in the cavity preparation.

Another factor influencing the degree of distortion is the method of removal from the mouth. Other articles have stressed the necessity of snapping the impressions out.[2,7,14] However, there is no evidence in the literature of any actual measurements to prove that distortion is greater by slowly teasing the tray out. Figure 16 shows the distortion which occurs on removal of the undercut die both by a straight snap thrust and by a slow

14. Bignell, K. A. Hydrocolloid technic: its use in crown and bridge work. Illinois D. J. 18:163 (May) 1949.

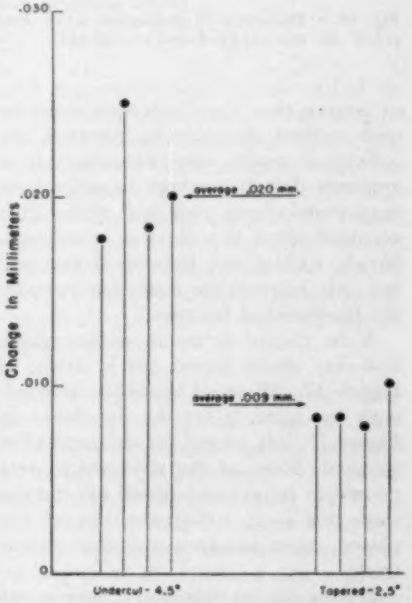

Fig. 15 • Dimensional change in hydrocolloid on removal of undercut and tapered die

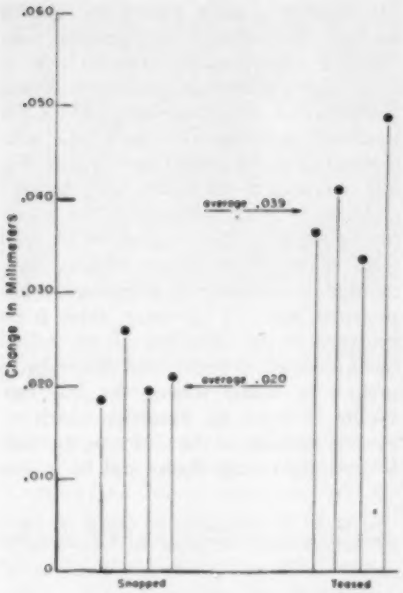

Fig. 16 • Distortion of impression when porcelain die was snapped and teased out

rocking motion. Four tests were made by each method. As could be expected, the individual results vary somewhat. It is apparent that the average distortion by a snap removal was only half that which occurred when the die was teased out. Slowly rocking the impression out will not only increase the distortion but also the likelihood of fracture.[2]

A die poured in an impression which was very slowly teased out is shown in Figure 17. All other variables were exactly the same as for the die shown in Figure 11, left, except for the method of removal. Some of the dies which were poured in impressions teased out did not show this great a distortion but all displayed some inaccuracy under critical study.

During this investigation it became apparent that the various brands of hydrocolloid had different general handling characteristics and different degrees of elasticity. As pointed out earlier, with some hydrocolloids it was necessary to vary the water-powder ratio of the stone slightly in order to secure accurate dies. This fact indicated that the degree of distortion on removal of the die might vary with the particular brand of hydrocolloid. Variation in the elastic recovery of the hydrocolloid could necessitate somewhat different levels of expansion for the stone.

In these series of tests, the elastic recovery was studied for all five hydrocolloids when the undercut die was snapped out. The degree of recovery will be dependent on the time at which measured. As Paffenbarger noted, some time may elapse before maximum recovery is obtained.[2] However, since it has been shown that the impression must be poured at once, readings were taken immediately after removal of the die. Again four tests were made for each hydrocolloid. The results are shown in Figure 18. The distortion varies for each brand with A showing the least deformation and D having twice that dimensional change. The results obtained with D corroborate the data of Gehring that fibers may reduce slightly the duplicating accuracy.[13] Although a minimum of permanent deformation is probably desirable, accurate dies can be made with all of these hydro-

Fig. 17 • Stone die poured in impression willfully teased out

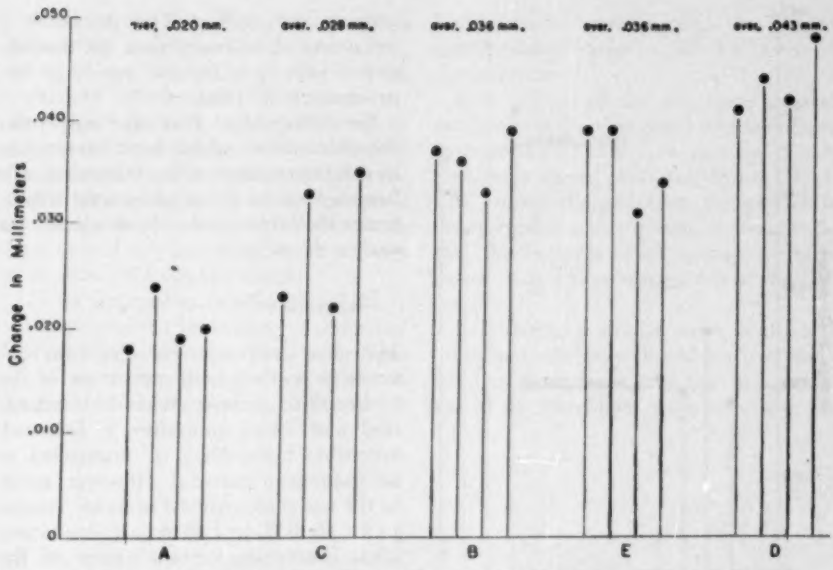

Fig. 18 • Dimensional change in five hydrocolloids when porcelain die was removed. Data indicate differences in elastic recovery of various brands

colloids. This indicates that the distortion induced during a snap removal is fairly uniform throughout the mold. In the case of impressions which were teased out, the deformation undoubtedly varies in different areas of the mold since it was impossible to produce accurate dies from these impressions regardless of the water-powder ratio or the particular stone employed.

Centering of Impression • For minimizing the strain present in a hydrocolloid impression, ideally there should be an equal amount of material around the teeth. Great differences in the distribution of the bulk of material around the mold increase the strain and thus the possibility of distortion during removal of the die or any subsequent storage. Figure 19 shows the results when the die was centered in the exact middle of the tray, as done in all the previous tests, and also when placed at one end of the tray. Readings were taken across the mold immediately after removal of the die. The distortion was twice as great when the die was placed off-center. It is true that on most impressions taken in the mouth, the tray must of necessity be fairly well centered in order to reproduce accurately all the teeth. However, on isolated teeth, one should take care to center the preparation properly.

Chilling • In order to minimize the strain in the impression, van Rossem[15] and others have cautioned against too rapid a chilling of the impression. The use of tap water at approximately 70°F. is recommended with ice water to be employed only during the final minutes of cooling, if at all. Practical dies made in this investigation indicate that chilling

15. van Rossem, W. J. Personal communication.

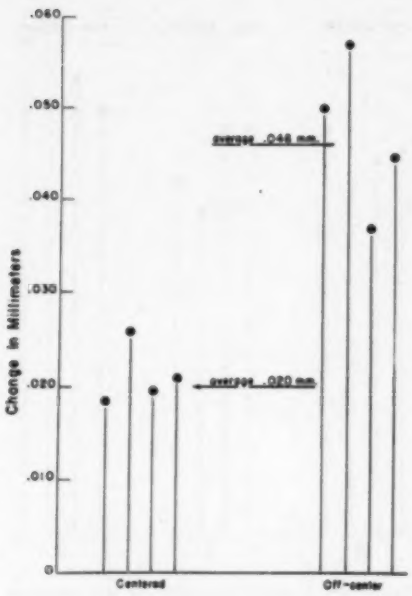

Fig. 19 • Distortion of impression on removal of porcelain die which was centered and also placed off-center

with ice water produces slight inaccuracies. The fit of the control casting on a die made from an impression which was chilled for the 10 minute period with water at a temperature of 34°F. is shown in Figure 20. This distortion is not great, but the die is not accurate as is the one in Figure 11, left, where tap water (72°F.) was employed for chilling. Some of the dies which were made from impressions chilled with ice water had no apparent inaccuracies; however, the distortion shown in Figure 20 was representative of the general trend. Another argument against the use of ice water is the discomfort to the patient from the sudden change in temperature. Naturally, the ideal technic for reducing the strain in the impression to a minimum would be to allow the impression to cool down to mouth temperature by normal heat loss and not employ any external chilling. This procedure is not practical, however, since the time required with this size tray would be approximately 20 minutes.

Some individual dies may vary from the observations which have been made in this paper but it is the purpose of this investigation to point out general trends, hence the large number of dies made for each series of tests.

SUMMARY

Microscopically accurate dies can routinely be secured with proper use of the hydrocolloid technic. When a standardized and sound procedure is followed, reversible hydrocolloid is unexcelled as an impression material. However, many of the variables involved in its use remain to be studied and there are conflicting ideas concerning certain phases of the technic. The accumulation of data such as is presented here will eventually lead to a universally accepted procedure.

A method for measuring the dimensional change of hydrocolloid in the dental tray has been described. These measurements have been correlated with practical dies made for critical cavity preparations. The results depicted here are representative of those obtained on over 3,500 individual stone dies.

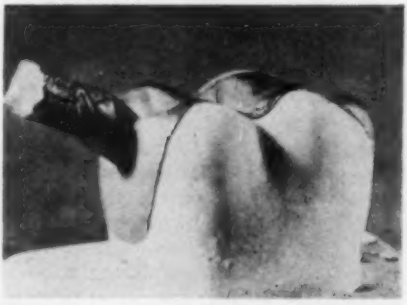

Fig. 20 • Die poured from impression chilled with ice water (34° F.). Note slightly open margins of control casting

None of the five hydrocolloids tested was stable in media of air, tap water, 100 per cent humidity or 2 per cent potassium sulfate. The best storage medium varies for each hydrocolloid, but in no instance can accurate dies routinely be produced from impressions which were stored for as long as 30 minutes, regardless of the media employed. All impressions should be poured within 15 minutes after removal from the mouth.

If an impression is allowed to dehydrate, subsequent immersion in water before pouring does not produce an accurate die. One of the factors which makes it impossible to compensate for syneresis by immersion in water is that the dimensional change varies in different areas of the impression.

On removal of the die, some permanent deformation occurred with all of the hydrocolloids tested. The amount of deformation varied with the hydrocolloid. The greater the undercut, the greater is the distortion and the data secured indicate the importance of a snap removal rather than a slow teasing out of the impression.

In order to minimize stress in the hydrocolloid, the tray should be well centered in the mouth and the impression should not be chilled with ice water.

Local anesthetics in operative dentistry

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Most investigations on local anesthetics are based on chemical analysis, supported by experimental data obtained by testing specific nerves in chosen laboratory animals.[1] Clinical investigations on human patients, when done under properly controlled conditions with significant samples, help in obtaining a more accurate picture of the use of these anesthetics under conditions which more nearly approach office procedure, and may help in evaluating those anesthetics which are offered to the profession by the manufacturer.

In a local anesthetic for operative dentistry there are three attributes which are of primary interest. How soon after injection will it take hold (induction time)? How complete will the absence of pain or sensation be (depth of anesthesia)? How long will the anesthesia last (duration)? The purpose of the present study was to compare four widely used local anesthetic solutions with respect to these three attributes, using them in operative dentistry procedures. Most work

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1. Hamilton, H. S.; Westfall, B. A., and Ferguson, J. K. W. Comparison of nine local anesthetics. J. Pharm. & Exper. Therap. 94:299 (Nov.) 1948.

done heretofore in the field of local anesthetics has been centered about their use in surgery.[2, 3] The statistical method lends itself to the evaluation of our data which was recorded on punch cards to facilitate the handling of the material.

DATA AND EXPERIMENTAL PROCEDURES

Of the four solutions investigated, one contained procaine, the others monocaine. All had epinephrine as the second active ingredient, in concentrations varying from 1:100,000 to 1:50,000. They were numbered as follows:

Solution 1: Procaine 2 per cent, epinephrine 1:50,000

Solution 2: Monocaine 1 per cent, epinephrine 1:75,000

Solution 3: Monocaine 1.5 per cent, epinephrine 1:100,000

Solution 4: Monocaine 1.5 per cent, epinephrine 1:50,000.

All four solutions were made by the same manufacturer.[4] They came in uniform standard size cartridges (Anestubes, 2.3 cc.). These were coded so that the operator was not aware of the type of solution and thus was not influenced in recording his findings. The full volume was injected in every case.

Injections were administered by 25 members of the staff of the operative dentistry clinic of New York University to clinic patients taken at random. A uniform technic of administration was employed by all operators for inferior alveolar injections, and likewise a uniform technic for infiltration injections—those described by Winter.[5]

No specific attempt was made to equate the many other variables besides volume and technic of injection which might perhaps have been relevant, such as patient's age, sex, individual differences in pain threshold, anomalous neuroanatomy, weather conditions,[6] or time of day. Since the subjects were taken at random in these respects and since the sample was large (1,586 separate injections), the odds are great that these factors did not materially affect the validity of the conclusions.

Each operator made observations of depth of anesthesia, induction time and duration. Depth of anesthesia was recorded as profound, fair or poor. "Poor" included failure to obtain anesthesia. Induction was recorded to the nearest minute up to 15 minutes; after that it was recorded as 15 minutes plus. Duration of anesthesia was recorded to the nearest 10 minutes up to 2½ hours, then as 150 minutes plus. All time measurements started from the moment when the injection had been completed.

Each operator decided for himself what was to be considered profound, fair or poor anesthesia, when the anesthesia had taken effect and when the anesthetic had worn off. All judgments were based on the usual office methods of questioning the patient and observing his reactions upon palpation with a pointed instrument and during the operative procedure.

Admittedly the measurement of each of the three response variables was subjective, with an unknown degree of reliability. Such subjectivity tends to obscure differences among the effects of the various solutions, to make them seem more alike than they truly are. For instance, if each estimate of the depth of anesthesia were made purely as a guess (that is, with zero reliability), any resulting differences among the four anesthetics

2. Winter, Leo, and Tainter, M. L. Clinical evaluation of local anesthetic solutions of increased strength. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 3:307 (May) 1945.

3. Seldin, H. M. Selection of anesthetic agent for dental surgery. J. Dist. Columbia D. Soc. 21:24 (July) 1947.

4. Novocol Chemical Manufacturing Company. This article is not to be construed as an endorsement of any of these solutions but merely an evaluation of their comparative effectiveness.

5. Winter, Leo. Operative oral surgery. St. Louis, C. V. Mosby Co., 1941, p. 46-50.

6. James, A. G. Weather conditions affecting patients' reaction to local anesthetics. J. D. Res. 27:175 (April) 1948.

Table 1 • Frequency of each depth of anesthesia (mandibular injections)

Depth	Solution 1		Solution 2		Solution 3		Solution 4		All solutions	
	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%
Profound	124	68.5	113	66.5	114	67.1	73	74.5	424	68.5
Fair	40	22.1	38	22.3	38	22.3	16	16.3	132	21.3
Poor	17	9.4	19	11.2	18	10.6	9	9.2	63	10.2
Total	181	100.0	170	100.0	170	100.0	98	100.0	619	100.0

Chi-square = 2.44 (Chi-square with 6 d.f.: 2.20 at 0.90; 3.07 at 0.80).

would necessarily be due to the operation of chance and would almost certainly be statistically interpreted as insignificant, especially when based on a large number of injections. Any statistically significant differences actually found, then, may be accepted with an even higher degree of probability than if the response variables had been more reliably measured.

From another point of view, too, the data leave something to be desired. With 25 different staff members involved, under the conditions of a busy university dental clinic, instructions were not always adhered to exactly. Consequently, of the total number of 2,442 separate injections administered during the study, 856 cases had to be discarded because of improper or incomplete recording. The conclusions, then, are based on the remaining 1,586 injections. Even among these, it appears from an examination of the frequency distributions that some of the operators almost certainly gave undue preference to the round number, five minutes, in estimating induction time and to the half-hour, hour, hour-and-a-half and two hour intervals in estimating duration.

Despite their limitations, the 1,586 injections form an adequate body of data on which to base conclusions concerning the questions at issue. They consisted of 619 mandibular (inferior alveolar) injections and 967 infiltration injections, divided among the four types of solutions as follows:

Solution	Mandibular injections	Infiltration injections	Total
1	181	276	457
2	170	301	471
3	170	227	397
4	98	163	261
Total	619	967	1,586

The patients ranged in age from 9 to 75 years. No untoward toxicity was observed at any age.

STATISTICAL TREATMENT, RESULTS AND CONCLUSIONS

Depth of Anesthesia • The results for depth of anesthesia are shown separately for mandibular injections (Table 1) and for infiltration injections (Table 2). In analyzing these results the assumed hypothesis was that no real difference existed among the four solutions, and Chi square[7] was used to evaluate the acceptability of the hypothesis.

For mandibular injections the probability that the differences among solutions in Table 1 are due to chance is between 0.80 and 0.90. Therefore, it was concluded that for mandibular injections no real differences in effectiveness with respect to depth of anesthesia had been demonstrated. There remains a possibility that such differences existed but were ob-

7. Johnson, Palmer O. Statistical methods in research. New York, Prentice-Hall, 1949, p. 91-96.

Table 2 • Frequency of each depth of anesthesia (infiltration injections)

Depth	Solution 1		Solution 2		Solution 3		Solution 4		All solutions	
	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%
Profound	209	75.7	181	60.1	155	68.3	125	76.7	670	69.3
Fair	51	18.5	83	27.6	50	22.0	30	18.4	214	22.1
Poor	16	5.8	37	12.3	22	9.7	8	4.9	83	8.6
Total	276	100.0	301	100.0	227	100.0	163	100.0	967	100.0

Chi-square = 23.54 (Chi-square with 6 d.f.: 22.46 at 0.001).

scured by the subjectivity in measuring degree of depth.

For infiltration injections the situation is quite different. Not once in a thousand times would the differences in Table 2 be likely to occur as a result of chance. Therefore, it was concluded that with infiltration injections Solution 1 and Solution 4 were about equal in effectiveness with respect to depth of anesthesia, and significantly superior in this respect to both Solution 2 and Solution 3.

The differences between Solution 2 and Solution 3, however, are not significant at the 5 per cent level. (Chi-square = 3.71, with 2 degrees of freedom.)

Induction Time • The distribution of induction times is presented in Table 3. In the tabulation of induction time, entries of 10, 11, 12 minutes were tabulated as a single category, and entries of 13, 14, 15 and 15 plus minutes were also tabulated as a single category. The number of

Table 3 • Distribution of induction times by type of injection and solution

Minutes of induction time	Mandibular injections					Infiltration injections				
	Sol. 1	Sol. 2	Sol. 3	Sol. 4	All solutions	Sol. 1	Sol. 2	Sol. 3	Sol. 4	All solutions
0	3	0	2	2	7	28	30	17	24	99
1	4	12	13	6	35	63	49	44	32	188
2	27	28	22	14	91	77	69	53	40	239
3	34	19	33	22	108	33	49	39	30	151
4	28	19	18	12	77	26	17	17	11	71
5	32	35	24	15	106	28	24	22	14	88
6	10	11	7	5	33	5	7	9	0	21
7	7	8	9	8	32	1	10	2	2	15
8	7	6	11	3	27	4	6	2	2	14
9	4	5	2	0	11	0	9	1	0	10
11*	11	11	14	4	40	3	16	4	2	25
15*	14	16	15	7	52	8	15	17	6	46
Total	181	170	170	98	619	276	301	227	163	967
Mean	5.33	5.60	5.52	4.92	5.39	2.86	3.89	3.71	2.85	3.38
Median	4.29	4.70	4.33	3.92	4.39	2.11	2.55	2.49	2.14	2.32
Upper Q3	6.28	6.94	7.44	6.00	6.73	3.73	4.99	4.61	3.38	4.18
Lower Q1	2.83	2.63	2.67	2.61	2.70	1.15	1.43	1.40	1.02	1.30
Inter Q range	3.45	4.31	4.77	3.39	4.03	2.58	3.56	3.21	2.36	2.88

*The class interval 11 includes induction times from 9½ to 12½ minutes; 15 includes all cases above 12½ minutes.

Table 4 • Frequency of satisfactory mandibular induction time (less than 9.5 minutes) and of unsatisfactory induction time (9.5 minutes or more) by type of solution

Mandibular induction time	Solution 1		Solution 2		Solution 3		Solution 4		All solutions	
	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%
Less than 9.5 minutes	156	86.2	143	84.1	141	82.9	87	88.8	527	85.1
9.5 minutes or more	25	13.8	27	15.9	29	17.1	11	11.2	92	14.9
Total	181	100.0	170	100.0	170	100.0	98	100.0	619	100.0

Chi-square = 1.97 (Chi-square with 3 d.f.: 1.65 at 0.80; 2.20 at 0.70).

entries in the five minute interval seems to be disproportionately high. Some of the operators may have estimated five minutes instead of noting the induction time more accurately. In view of these facts, especially the unknown true mean of the 15 plus interval, it is impossible to obtain an accurate estimate of the standard deviation (even the mean must be an approximation), and analysis of variance would not lead to accurate probability estimates. Therefore as measures of central tendency we have used medians; as measures of variability, quartiles; and as a method of interpreting the significance of differences between the various solutions, Chi-square. Means, despite their approximate nature, are presented in addition to the medians in order to give some indication of the positive skewness of the distributions. In computing the mean, 15 minutes was assumed as the average value for the last class interval.

For all solutions combined the median mandibular induction time was 4.4 minutes. Solution 4 showed the best median induction time, 3.9 minutes; Solution 2, the worst, 4.7 minutes. From a practical point of view these differences are immaterial. For a mandibular injection most dentists would consider any of these induction times satisfactory.

More to the point is the question of how the various solutions differed, if at all, in the proportion of unsatisfactory induction times. Nine and five-tenths minutes was used as the dividing point, since this represents a reasonable waiting period before doing operative work under office conditions. Longer induction times have, for the purpose of these calculations, been considered unsatisfactory. Table 4 presents the results. The proportion of unsatisfactory induction times for mandibular injections varies from 11.2 per cent for Solution 4 to 17.1 per cent for Solution 3. Statistical analysis shows that the differences in Table 4 might arise by chance more than seven times out of ten. So it was concluded that for mandibular injections no significant differences in induction times were demonstrated among the four solutions.

For infiltration injections, also, the distribution of induction times is given in Table 3. The median for all solutions was 2.3 minutes. The medians of Solution 1 and 4 were lowest, 2.1 minutes for each; those for Solutions 2 and 3 were highest, 2.6 and 2.5 minutes respectively.

If 5.5 minutes is considered as the boundary point between satisfactory and unsatisfactory infiltration times, the results shown in Table 5 are obtained. Solutions 1 and 4 are best, with 7.6 per cent and 7.4 per cent respectively, of unsatisfactory induction times; Solutions 2 and 3 are worse, with 20.9 per cent and 15.4 per cent. Such differences would not occur by chance even one time in a

Table 5 • Frequency of satisfactory infiltration induction time (less than 5.5 minutes) and of unsatisfactory induction time (5.5 minutes or more) by type of solution

Infiltration induction time	Solution 1		Solution 2		Solution 3		Solution 4		All solutions	
	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%
Less than 5.5 minutes	255	92.4	238	79.1	192	84.6	151	92.6	836	86.5
5.5 minutes or more	21	7.6	63	20.9	35	15.4	12	7.4	131	13.5
Total	276	100.0	301	100.0	227	100.0	163	100.0	967	100.0

Chi-square = 28.32 (Chi-square with 3 d.f.: 16.27 at 0.001).

thousand. So it may be concluded that for infiltration injections, Solutions 1 and 4 are definitely superior with respect to induction time.

When Solution 2 and Solution 3 are specifically compared, it is found that the differences between them might arise by chance more than one time in ten (Chi-square = 2.25 with 1 d.f.); so it cannot be concluded that Solution 2 is significantly worse than Solution 3.

Duration • The frequency distributions for duration are presented in Table 6. In the tabulation of duration periods, entries of 120 minutes and 130 minutes were tabulated as a single category; similarly, entries of 140, 150, and 150 plus minutes were tabulated as one category. Examination of the distribution reveals frequencies for the 60 minute, 90 minute, and 120 minute class intervals that seem disproportionately high, as if some of the operators had been estimating to the nearest half hour instead of more accurately. For these reasons the same kinds of statistical procedure were used for duration as for induction time. In computing the mean, 150 minutes was assumed as the average value for the last class interval.

For mandibular injections the median duration of anesthesia was 65 minutes for all solutions combined. Solution 4 was outstandingly the best, with a median duration of 93 minutes; the other three medians were 61 minutes for Solution 1, 68 minutes for Solution 2, and 63 minutes for Solution 3.

When the duration periods were grouped into three categories, less than 45 minutes, 45 to 75 minutes, and more than 75 minutes, the resulting Chi-square for mandibular injections, with 6 d.f., was 31.88, which is beyond the 0.001 level of significance. On the whole, then, the differences between the solutions with respect to mandibular duration are significant.

If a duration of 45 minutes or more is considered as satisfactory and a shorter duration as unsatisfactory, and the mandibular injections are divided on this basis, the results shown in Table 7 are obtained. A specific comparison between Solution 4 and combined Solutions 2 and 3 as to the proportion of satisfactory mandibular durations reveals that the superiority of Solution 4 is significant at the 10 per cent level but not at the 5 per cent level.

For infiltration injections, the median duration is 59 minutes for all solutions. The differences among solutions are negligible. If means are considered, Solution 4 with a mean duration of 70 minutes seems appreciably above the 62 minute mean duration for all the solutions.

For infiltration injections, also, the duration periods were grouped into three

Table 6 • Distribution of duration periods by type of injection and solution

Minutes of duration	Mandibular injections					Infiltration injections				
	Sol. 1	Sol. 2	Sol. 3	Sol. 4	All solutions	Sol. 1	Sol. 2	Sol. 3	Sol. 4	All solutions
0	8	11	12	3	34	2	14	9	3	28
10	4	2	3	0	9	7	8	4	0	19
20	4	3	2	1	10	22	17	10	5	54
30	19	9	5	5	38	17	29	27	12	85
40	9	8	7	1	25	33	29	19	12	93
50	11	12	12	6	41	22	31	20	19	92
60	57	36	52	13	158	80	74	70	41	265
70	8	12	7	3	30	13	16	11	17	57
80	9	15	13	7	44	13	18	15	11	57
90	23	36	25	13	97	34	33	22	16	105
100	5	5	3	5	18	5	7	3	3	18
110	5	1	1	1	8	5	2	1	0	8
125*	13	13	19	23	68	17	20	12	14	63
150*	6	7	9	17	39	6	3	4	10	23
Total	181	170	170	98	619	276	301	227	163	967
Mean	66.1	70.7	71.6	94.6	73.4	62.8	59.4	59.4	70.0	62.2
Median	61.2	68.3	63.5	92.7	64.6	59.4	58.0	58.5	61.5	59.2
Upper Q	87.9	90.4	90.8	121.7	92.8	83.5	79.3	76.7	86.4	80.7
Lower Q	46.1	52.9	50.3	61.5	54.5	41.4	37.5	36.6	49.6	41.0
Inter Q range	41.8	37.5	40.5	60.2	38.3	42.1	41.8	40.1	36.8	39.7

*The class interval 125 includes durations from 115 to 135 minutes; 150 includes all cases above 135 minutes.

categories, less than 45 minutes, 45 to 75 minutes, and more than 75 minutes, and Chi-square calculated. The result was 9.92, which for 6 d.f. is not significant at even the 10 per cent level.

It is still possible that a single cut at some logically predetermined point may result in truly significant differences even when over-all variations are less than significant. As with mandibular injections, 45 minutes is considered as the boundary point between unsatisfactory and satisfactory duration periods. On this basis, the resulting differences among solutions are significant at between the 5 per cent and the 2 per cent levels. (See Table 8.) Solution 4 is superior to the others.

Since the results for duration are more or less similar for both mandibular and

Table 7 • Frequency of satisfactory mandibular duration of anesthesia (45 minutes or more) and of unsatisfactory duration (less than 45 minutes) by type of solution

Mandibular duration	Solution 1		Solution 2		Solution 3		Solution 4		All solutions	
	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%
45 minutes or more	137	75.7	137	80.6	141	82.9	88	89.8	503	81.3
Less than 45 minutes	44	24.3	33	19.4	29	17.1	10	10.2	116	18.7
Total	181	100.0	170	100.0	170	100.0	98	100.0	619	100.0

Chi-square = 8.74 (Chi-square with 3 d.f.: 7.82 at 0.05; 9.84 at 0.02).

Table 8 • Frequency of satisfactory infiltration duration of anesthesia (45 minutes or more) and of unsatisfactory duration (less than 45 minutes) by type of solution

Infiltration duration	Solution 1		Solution 2		Solution 3		Solution 4		All solutions	
	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%	No. of injections	%
45 minutes or more	195	70.6	204	67.8	158	69.6	131	80.4	688	71.1
Less than 45 minutes	81	29.4	97	32.2	69	30.4	32	19.6	279	28.9
Total	276	100.0	301	100.0	227	100.0	163	100.0	967	100.0

Chi-square = 8.72 (Chi-square with 3 d.f.: 7.82 at 0.05; 9.84 at 0.02).

infiltration injections, our conclusions are based on the combined findings. With respect to the duration of anesthesia, Solution 4 is best. Among the other three solutions no significant difference exists in this respect.

Mandibular vs. Infiltration Results • It may be of some interest to compare the findings for mandibular injections with those for infiltration injections. As to depth of anesthesia no significant difference was found between the two types of injection. It may be that the operators unwittingly used different subjective standards of "profound," "fair" and "poor" with mandibular injections than with infiltration injections. Or it may be that the proportion of profound, fair and poor injections for each solution actually was about the same for both types.

With respect to induction time, infiltration injections, as was expected, took hold more rapidly. Generally they became effective in little more than half the time required by mandibular injections.

As to duration, mandibular injections lasted, on the average, about five to ten minutes longer than infiltration injections. But since, as a rule, with mandibular injections it took a couple of minutes longer for anesthesia to set in, the difference in actual time available for operating under anesthesia is to that extent reduced.

DISCUSSION

Our measures of depth of anesthesia, induction time and duration are, of course, not completely independent measures. Probably the most influential common factor among them is that all injections which failed to produce observable anesthesia were recorded not only as poor in depth, but also as requiring more than 15 minutes for induction and as of zero duration. Unfortunately, in recording the results no distinction was made between absence of anesthesia and other degrees of poor anesthesia, so the actual number of cases of the above sort is not accurately known, though we do know that it is no greater than 49.

Moreover, there is the possibility that a "halo" effect may have entered into the judgments. That is, an operator may have permitted his judgment concerning one aspect of the anesthesia to be swayed by another aspect. Thus in a case where anesthesia lasted for less than five minutes the operator may have interpreted the anesthesia as poor in depth mainly as a result of that very fact.

And in addition to the foregoing spurious factors there probably is some actual association among induction time, depth of anesthesia and duration of anesthesia.

The existence of definite correlation among the various measures becomes apparent from a cursory comparison of the

proportion of poor injections in the worst category of induction time or in the worst category of duration with the proportion of poor injections among all the categories combined. In the worst category of induction time (more than 12½ minutes) 60 out of 62 injections, or 97 per cent, were judged poor in depth of anesthesia; in the worst duration category (less than five minutes) 54 out of 98 injections, or 55 per cent, were so judged; whereas in all the categories combined the proportion of poor anesthesias was only 146 out of 1,586, or 9 per cent.

To a certain extent, then, the apparent superiority of Solution 4 with respect to infiltration induction time and infiltration duration may be merely a restatement of its superiority with respect to depth of anesthesia, as may also be true for the similar superiority of Solution 1 with respect to infiltration induction time. But a detailed examination of the various distributions indicates that more probably the significant differences found are not merely artifacts but in part real evidence of superiority.

SUMMARY

The following four widely used local anesthetic solutions made by the same manufacturer were compared as to depth of anesthesia, induction time and duration of anesthesia:

Solution 1: Procaine 2 per cent, epinephrine 1:50,000.

Solution 2: Monocaine 1 per cent, epinephrine 1:75,000

Solution 3: Monocaine 1.5 per cent, epinephrine 1:100,000

Solution 4: Monocaine 1.5 per cent, epinephrine 1:50,000.

The data on which the conclusions are based consisted of 619 mandibular injections and 967 infiltration injections administered at the operative dentistry clinic of New York University.

With the mandibular injections no differences significant at the 5 per cent level were found among the four solutions, except that Solution 4 had a significantly higher proportion of satisfactory durations (45 minutes or more) than the others.

With the infiltration injections Solutions 4 and 1 were significantly superior to the other two in all respects, except that Solution 1 was no better than Solutions 2 and 3 in duration of anesthesia.

Of the four solutions investigated Solution 4 is the best all-around local anesthetic for operative dentistry, with Solution 1 next. Solutions 2 and 3 are definitely inferior.

A Member's Trust • Every member and every official of an organized group is in the position of a trustee, and the trust he guards is the organization's ideal. Since (except in the case of open and flagrant transgression) no penalty can be attached to abuse of this fiduciary obligation, it becomes a matter of simple honor and decency not to abuse it. *"Organized Effort," The Journal of the International College of Surgeons 15:237, February 1951.*

The absorption of enzyme inhibitors and antibiotics in dental plaques

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A dentifrice has been considered primarily a pleasant aid to the otherwise unpleasant task of cleansing the teeth and mouth. In 1947 the Council on Dental Therapeutics of the American Dental Association indicated that a therapeutic dentifrice was a probability and on the basis of this and other factors ceased awarding the Seal of Approval to cleansing dentifrices. It was stated that they would consider only those for which therapeutic claims were made.[1] The idea of a therapeutic dentifrice is not new. Many claims in regard to the prevention of dental caries have been made from time to time, particularly in regard to "antiseptic dentifrices" but not until recently was any experimental data available to substantiate the idea.

In 1947 Kesel[2] found that the ammonium ion in a concentration of 50 mg. per 100 cc. would effectively prevent the growth and reproduction of *Bacillus acidophilus* and the formation of acid in sugar-saliva mixtures. On the basis of this work he proposed the use of an ammoniated dentifrice and mouthwash and he obtained preliminary data that indicated that the proper use of these substances would effectively reduce the *B. acidophilus* count in the saliva of caries-active individuals. The theory concerning the cause and nature of the carious process has been rather extensively explored.[3,4] On the basis of the generally accepted theory one should be able to prevent dental caries if the rapid conversion of the residual fermentable sugar in the mouth could be prevented from forming acids. This has been done effectively by the elimination of sugars from the diet[5,6] and by the use of proper oral hygiene procedures.[7] On the basis of the same theory, it should be possible to prevent acid formation by the proper use of enzyme inhibitors or by directly preventing the growth and metabolism of the

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microorganisms. The introduction of enzyme inhibitors in the mouth concurrently with fermentable sugars will effectively prevent the formation of acid from the sugar.[8] All efforts to find a substance that will have a prolonged effect, so that when the substance is introduced into the mouth in the morning the effect will be sufficiently persistent to inhibit acid formation from sugars ingested any time during the day, have been uniformly unsuccessful with the exception of the antibiotic penicillin.[8]

It has been found that when many substances that will definitely inhibit acid formation in the mouth are incorporated into a dentifrice, and the dentifrice is used in the morning on arising and in the evening before retiring, they are entirely without effect.[9] Further investigation indicates that when they are introduced in the mouth in this manner the effect is persistent for only a short period of time, usually about 20 to 30 minutes. When penicillin is used in the same manner, or by means of a lozenge or mouthwash, the effect lasts as long as 24 hours.[8] It is further noted that the morning and night use of a penicillin dentifrice will cause a persistent drop in acidophilus counts and will actually reduce caries activity as determined by clinical means.[10]

There are many substances as effective as penicillin in their effect on acid production in the mouth and in sugar-saliva mixtures,[11,12,13] but as yet none has been found in which the effects persist for such long periods of time. In view of this it was thought of interest to determine the mechanism and cause of this persistent effect and, if possible, formulate substances that would act similarly.

When the conditions that exist in the mouth are considered, it is evident that the retention of water-soluble substances about the teeth would be of extremely short duration unless held to the surface of the teeth by some chemical or physical action. It is known that the fluoride ion will attach itself to the surfaces of the teeth and in many instances may even penetrate the enamel and displace the hydroxyl group from the hydroxy apatite of the enamel substance. There is some indication that other ions may penetrate the teeth, but there is no reason to believe that organic substances such as penicillin could become incorporated in or on the enamel surface. It is known that there is an organic covering sometimes called a film or a plaque which is usually present at least on the inaccessible surfaces of the teeth, and investigation of this material indicates that it is protein in nature.[14,15] Thus, if an enzyme inhibitor or antibiotic could be made to become absorbed or adsorbed in this surface it might be possible to retain them for considerable periods of time. For this reason the absorption of the various antibiotics and enzyme inhibitors tested by Ludwick, and his co-workers, into protein was measured. It was found that several of the antibiotics were readily absorbed into gelatin. In view of this it was decided that proteins more analogous to the dental plaque must be used.

PROCEDURE

Human teeth were set in a glass tube in such a manner that saliva-sugar mixtures could constantly pass over the teeth.

8. Unpublished work done in the chemical laboratory, Northwestern University Dental School.

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12. Calandra, J. C., and Fosdick, L. S. Effect of amino acids on the rate of acid formation in saliva. J. D. Res. 26:303 (Aug.) 1947.

13. Fosdick, L. S., and Calandra, J. C. Effect of some chemicals on the rate of acid formation in saliva. J. D. Res. 26:309 (Aug.) 1947.

14. Kirk, E. C. A consideration of the question of susceptibility and immunity to dental caries. D. Cosmos 52:729 (July) 1910.

15. Campaigne, E., and Fosdick, L. S. Production and characteristics of synthetic mucin plaques. Northwestern Univ. Den. Res. & Grad. Quar. Bul. (May 2) 1938, p. 14.

The tubes were then partially filled with saliva and the saliva was allowed to pass over and over the teeth while maintained at 37.5° C. The saliva was changed daily for a period of five days. At the end of this period it was noted that a thick covering of plaque material was present on each tooth. The saliva was removed from the tube and the plaques were washed gently with water. The tube was then filled with a solution containing 250 mg. per 100 cc. of the inhibitor or antibiotic. The test substance was permitted to remain in contact with the plaque for a period of five minutes after which the tube and contents were washed for a period of 30 minutes by means of running water. Samples of the plaque about 1 cc. in volume were then placed in a Snyder tube which had been previously inoculated with carious-active saliva. Identical Snyder tubes except for the test material were prepared for controls. The tubes were then incubated at 37.5° C. and if no color change was observed in the test material in 48 hours the inhibitor was said to be effective, provided acid was produced in the controls.

RESULTS

The substances tested by this method consisted of penicillin, streptomycin, bacitracin, tyrothricin, citrinin, menadione, glyceric aldehyde and ammonia. As shown in the table, the only one of these substances that was retained and was effective in inhibiting acid formation was penicillin. On the basis of this it would seem that the reason why penicillin dentifrice, when used twice a day, will inhibit the growth of lactobacillus *in vivo* and will inhibit caries activity as determined by the Snyder test is that by attaching itself to the surface of the tooth it thereby remains active during the subsequent period of the ingestion of carbohydrates. Whether this adherence is absorption or adsorption is as yet undetermined, or whether penicillin itself remains or imparts some residual activity to the plaque is also undetermined. However, the fact that other enzyme inhibitors failed to adhere to the dental plaque provides an explanation as to why they are not effective when used morning and night in a dentifrice and why they are effective only when used during or after the ingestion of sugars. Since penicillin is now available in radio-active form, experiments are under way to see whether the penicillin molecule remains or whether a residual activity may explain the effect.

Table • Substances tested for retention by dental plaque material

Inhibitor	Inhibitor concentration mg. per 100 cc.	Retention
Tyrothricin	1.0	–
Gramicidin	80.0	–
Streptomycin	0.5	–
Bacitracin	1.0	–
Penicillin	1.0	+
Glyceric aldehyde	10.0	–
Menadione	1.0<	–
Citrinin	10.0<	–
Copper chlorophyllin	50.0	–
Ammonia	50.0	–

SUMMARY

The absorption of some antibiotics and enzyme inhibitors into dental plaques has been determined. It was found that the only compound that imparts a lasting effect in the mouth is penicillin. Since this was the only compound that was retained by the plaque material, it was suggested that the cause of the persistent action is the absorption or retention of the material on the plaque.

Role of the prosthodontist in the rehabilitation of cleft palate patients

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The oral prosthodontist has many responsibilities to a cleft palate patient if he is the first specialist consulted by this patient. His responsibilities in this instance are essentially:

1. To construct a prosthesis which will subserve speech purposes and improve esthetics, mastication and deglutition.
2. To refer the patient to a speech clinician after the completion of the prosthesis.
3. To refer the patient to a maxillofacial surgeon for plastic surgery if that is necessary.
4. To become acquainted with the personal, emotional, social and vocational problems of the patient and to refer the patient to a psychologist and vocational counsellor for guidance and help in adjustment.
5. To know where financial support can be obtained, if that is necessary, through social agencies and clubs.
6. To arrange for periodic examinations of the prosthesis and oral cavity.
7. To become objectively interested in the patient and follow his progress in rehabilitation.

In general the oral prosthodontist views his patient as a person rather than a deformed oral cavity. He is aware of the psychosocial problems of his patient but does not assume the role of the counsellor. Instead he seeks the services of his coworkers, the maxillofacial surgeons, speech clinicians, psychologists, vocational counsellors and social workers, in the rehabilitation of the patient. The prosthodontist is the director of the rehabilitation program when the patient contacts him first, otherwise, the prosthodontist becomes one specialist in the program with one of his coworkers as director of rehabilitation arrangements.

His responsibilities in a program where he is not the director will be decreased. He assumes the first and sixth responsibilities described and writes a report including recommendations to the director of the rehabilitative program. The oral prosthodontist, then, has various responsibilities as a director and as a contributing coworker. However, his various roles necessitate the obligation to construct an oral prosthesis, a speech aid, which will subserve speech purposes, improve esthetics, mastication and deglutition. He also must observe the effectiveness of his prosthesis in periodic examinations.

ORAL SPEECH ACTIVITY

Since the most important requisite of a prosthesis is to subserve speech purposes, the oral prosthodontist must know about oral speech activity in order to construct an effective speech aid. A complete understanding of the speech mechanism and process is the responsibility of the speech specialist. However, it is important for the prosthodontist to have some

Fig. 1 • Occlusion. Left: Mutilated occlusion after surgery. Right: Functional occlusion with prosthesis

knowledge of speech activity within the oral cavity since it is here that he attempts to subserve this activity with his technical skill. The oral relationship necessary for normal speech is the separation of the oral and nasal cavities by the continuity of the hard and soft palates from the teeth to the pharyngeal area. The separation of the two cavities at the oronasopharyngeal level is achieved by coordinated movements of the five paired soft palatal muscles and a group of pharyngeal muscles. The complete separation of these two cavities anteroposteriorly to the pharyngeal cavity is necessary to maintain a normal proportion of nasal and oral resonance and to maintain and utilize air in the oral cavity for articulation.

The destruction of this palatal unity by any degree of cleft palate will result in an inability to maintain oral resonance and a sufficient amount of air in the oral cavity for articulation. The normal balance of nasal and oral resonance is destroyed and nasal resonance becomes predominantly audible. Air enters the nasal cavity instead of being restricted to the oral cavity and escapes through the nares during speech. The cleft palate patient attempts to offset this by compensatory movements of the tongue and muscles about the nostrils. These compensatory efforts are seldom rewarding. The speech attempts of the cleft palate individual result in nasality and defective articulation. These speech characteristics are the audible label of the existing deformity.

REQUISITES OF A SPEECH AID

The specific articulation and resonance problems of the cleft palate patient are within the area of the speech clinician rather than the prosthodontist. However, the prosthodontist must realize that it is essential to establish an adequate separation of these two cavities to assist the speech clinician and the patient to eliminate compensations and to utilize remaining muscular activity in order to improve articulation and to reduce nasality. The prosthodontist establishes a substitute separation with artificial materials. The speech aid covers the extent of the cleft anteroposteriorly and laterally beyond the margins of the cleft in repose. The extent of the prosthesis will depend on the degree of cleft palate so that each speech aid will be different and individual. However, there are basic requisites of a prosthesis if it is to subserve oral speech activities. They may be summarized as follows:

1. The speech aid should establish occlusion if it carries dental replacements. This is necessary for the easy and exacting production of many frontal sounds (Fig. 1).

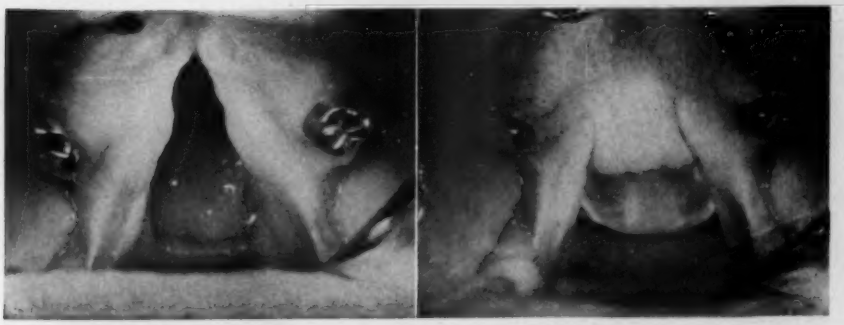

Fig. 2 • Pharyngeal area. Left: Area without speech aid. Right: Functional contact of speech aid in situ

2. It should be sufficiently long, anteroposteriorly, to enable free and comfortable contact with the pharyngeal muscles (Fig. 2). The movement of these muscles is forward and toward the posterior pharyngeal section of the speech aid.

A forceful contact of these muscles will result in irritation, denasalization, disturbances in the eustachian tube and insecure retention of the prosthesis. Lack of muscular contact with the speech aid at this level will permit sound and air to escape into the nasal cavity. A proper approximation of the pharyngeal muscles and the speech aid to restrict air and sound to the oral cavity is essential for improved articulation and resonance. It is also necessary to provide efficient deglutition.

3. The prosthesis should be amply wide to permit easy and comfortable soft palatal movement without losing contact of the tissue with the prosthesis during the activities of speech and deglutition (Fig. 3). This soft palatal movement is generally away from the lateral surfaces of the speech aid rather than toward it. An incomplete contact on the lateral surfaces of the prosthesis permits air and sound to escape into the nasal cavity at this level and to escape between the superior surface of the speech aid and the cleft structure resulting in inadequate retention.

4. It should be vaulted as much as is anatomically and prosthetically desirable (Fig. 4). Oral spaciousness is necessary to permit free, easy and rapid manipulations of the tongue during speech. It is also requisite in oral resonance and helpful in efficient mastication and deglutition.

5. Such an appliance should be easily modified or altered. The material must lend itself to extension or reduction (Fig. 5). Frequent alterations become necessary as muscular development occurs during speech improvement. In order to main-

Fig. 3 • Speech aid in situ *with functional lateral contact*

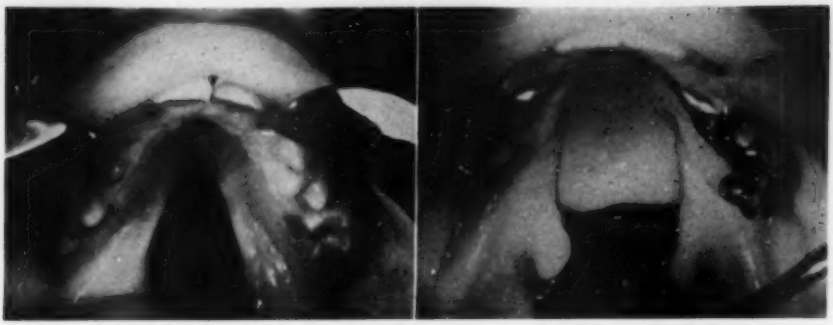

Fig. 4 • Anatomic and prosthetic palatal vaults. Left: Vault without prosthesis. Right: Prosthesis showing vault

tain the effectiveness of a speech aid changes must be made to accommodate these various muscular developments.

6. It also should be comfortable. The materials used in the construction of a prosthesis must be light in weight, smoothly finished and easily cleaned. Acceptance and tolerance of the speech aid is assisted by a general feeling of comfort and permits the patient to concentrate on improving his functions, especially speech.

Fig. 5 • Speech aid constructed with acrylic plastic

A speech aid designed to meet these requirements assures the prosthodontist, speech clinician and patient that it will subserve speech purposes. The speech clinician's responsibility is to guide the patient in the re-education of muscular movements about his speech aid and to alter tongue movements. Three factors condition the amount of speech improvement to be expected: (1) the effectiveness of the speech aid, (2) the skill of the speech clinician and (3) the capabilities of the patient. It is the responsibility of the oral prosthodontist to be certain that the patient's speech improvement is not restricted by an ineffective speech aid.

SUMMARY

It is the obligation of the prosthodontist to design and produce a prosthesis that is an aid to oral speech activity. He must continue his interest in the patient after the speech aid has been constructed in order to evaluate his prosthetic efforts and to determine the speech improvement

of the patient. The role of the prosthodontist is one of director or coworker in a rehabilitative program. Lately diagnostic clinics have been organized in which the maxillofacial surgeon, oral prosthodontist, speech clinician, psychologist, vocational counsellor and social worker participate and share jointly in planning the rehabilitation programs of the patients examined. This is a desirable arrangement. Each specialist has contributions to make and is aware of what is to be done by the others. Such a program promises a satisfactory rehabilitation. The diagnostic clinic is a cooperative arrangement which is ideal and is most profitable for the cleft palate patient.

Fulton Building

The dilemma in the management of thumbsucking

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In the controversial subject of thumbsucking, there are two principal schools of thought, the psychological and the dental and the two have never met. This has resulted in confusion on the part of the mother as to what course of action to follow. Shall she risk the danger of psychological frustration in her child or a dental deformity?

The situation must be analyzed from both the psychological and the dental point of view and a conclusion drawn which will satisfy everyone concerned. A plan of procedure should be afforded the bewildered parent.

DEFINITION OF THUMBSUCKING

Thumbsucking, as discussed here, does not refer to thumb-chewing of the infant. It does not refer to the gentle insertion of the thumb part way into the mouth coupled with an occasional mild sucking pressure. Rather it implies an insertion many times every day of the whole thumb or fingers deep into the oral cavity. The pad is almost always toward the palate and the thumb reaches as far back as its length and the gag reflex will permit. The lips are closed around the thumb forming a seal and powerful sucking action of the cheeks is employed.

THUMBSUCKING AS A HABIT

A good definition of a habit is that offered by William James.[1] He states that

> An acquired habit, from a physiological point of view, is nothing but a new pathway of discharge formed in the brain, by which certain incoming current ever after tends to escape. . . . A simple habit, like every other nervous event—the habit of snuffling, for example, or of putting one's hands into one's pockets, or

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1. James, William. Psychology. New York, Henry Holt & Co., 1923

of biting one's nails—is, mechanically nothing but a reflex discharge; and its anatomical substratum must be a path in the system. The most complex habits are, from the same point of view, nothing but concatenated discharges in the nerve centers, due to the presence there of systems of reflex paths, so organized as to wake each other up successively—the impression produced by one muscular contraction serving as a stimulus to provoke the next, until a final impression inhibits the process and closes the chain.

For the purposes of this article, habits may be classified as "meaningful habits" and "empty habits." A meaningful habit is the basis of all habit formation. For instance, thumbsucking undoubtedly may arise from an emotional need. However, when that need or a related emotional basis is gone, the habit will cease of itself. But there usually appears to be a time lag between these two events. The time lag is often long enough to permit further indulgence in the habit. This time lag may exist for months or even years. During this period, an "empty habit" exists.

At birth the baby responds to sensory stimuli and reflex habits begin to be established. Such habits are the result of hereditary and acquired responses to stimuli. These responses overlap and combine to form the intricate patterns of activity of life. When a child is learning an act, many things involved in the act are already familiar. As new movements are added to his experience, he gradually modifies them until a final pattern has been established. This is called a "learned response." Frequent repetitions finally make the response practically automatic and the habit is formed. The longer a fixed habit exists, the more difficult it is to change.

Since a habit is automatic,[2] it simplifies movements and diminishes fatigue. Exhaustion would follow the simplest act if conscious effort were necessary for every movement.

Every individual is a bundle of habits. Most habits are desirable because they conserve time and energy, but others are injurious and upset normal function or tend to deform.[3] However, these injurious habits often may be allayed by corrective habits. Hence, corrective habits may be our greatest ally.

Childhood acts of habit seem to stem from five main sources, instinct, insufficient or incorrect outlet for energy, pain or discomfort, abnormal physical size of body parts, imitation of, or imposition by, parents and others.

It is generally agreed that the main instinctive act of the infant is sucking. Levy[4] declares that all abnormal sucking habits result from insufficient sucking at the breast or bottle whereas Johnson[5] attributes sucking and associated habits (nailbiting, tongue-biting or lip-biting) to hunger and to lack of stimulation or opportunity for progressive movements and manipulation. To increase sucking time, Levy advises the use of a nipple with a fine hole for bottle feeding; for breast feeding, the possibility of supplementary sucking by return to the pacifier. Johnson advocates making certain that periods of hunger are not prolonged. To permit progressive movement and manipulation she points out that

Hard surfaces (firm, flat mattresses and play pen floors that are not slick) that offer resistance, stimulate toward pushing, rolling, kicking, and pulling. Objects that are stable and hold fast under the forceful attacks of the infant, but which stimulate the child to climb, maintain equilibrium and experiment with movement, provide for wholesome activities. The increased activity due to hunger may be even utilized in this way. When the infant is hampered by clothing, is placed upon soft beds and pillows during activity periods, or is provided with dainty but wobbly play pens, the gross muscle activities are curtailed. Compensation is often found in the easily accessible finger or thumb.

2. Johnson, A. LeRoy. Habit. Ortho. Int. Jnl. 1:71 (Feb.) 1915.

3. Johnson, A. LeRoy. Basic principles of orthodontia. 4. Habit and adaptation. D. Cosmos 65:845 (Aug.) 1923.

4. Levy, David M. Thumb- and finger-sucking from the psychiatric angle. Angle Orthodont. 7:100 (April) 1937.

5. Johnson, B. J. Child psychology. Springfield, Charles C Thomas Co., 1932, p. 439.

HOW THUMBSUCKING CAN CAUSE DAMAGE

The physical conformation of the face, jaws and dental arches is attained by the interaction of complex forces.[6] From a physiological standpoint, these forces may be roughly grouped under heredity, growth, development and function.

Few, if any, human beings are able to escape the vicissitudes of hereditary circumstances and adverse environmental conditions. All faces represent the end result of these complex forces which have been modified by detrimental influences such as malnutrition, disease, pressure and trauma. Because the detrimental effects of thumbsucking fall essentially within the category of pressure influences, the primary concern is with the mechanism of normal function and facial form. Noyes writes:

> We may for convenience begin with the teeth, which contrary to common opinion, are extremely mobile units in the masticatory mechanism. Their position, once their form and location in the jaws is determined by heredity, growth, and development, is maintained by the myriad fibres of the peridental membranes. This membrane is calcified on the root side into the cementum of the tooth, and on the alveolar aspect into the spicules of alveolar bone. Through this membrane, pressures are easily transmitted from the tooth crown to the supporting bone. The alveolar bone is peculiarly responsive to these pressures which bring about adaptive changes in the bone architecture. Thereby the tooth position is continually determined by environmental forces.
>
> As little as 50 Gm. of pressure, operating continuously over a period of twelve hours, will produce a measurable displacement of a tooth; and the mechanical pressures of an orthodontic appliance will move teeth at the rate of one or more millimeters a month. Hence, a tooth is not held in the substance of the jaws like a post cemented in a posthole, but rather it is swung like a hammock in a specialized bone structure which responds to inherent physiological, as well as extraneous pressures.
>
> The anatomy of the crowns of the teeth also affects their positions as they make contact with their neighbors in the same dental arch and with their antagonists in the complementary denture. As the cuspal surfaces of the teeth from maxilla and mandible aproach one another in the process of eruption, the fraction of a millimeter may at one time determine whether they fall in normal or abnormal position. Once their fate has been determined, functional forces of occlusion may be beneficial or detrimental in assisting them in maintaining a normal relation or locking them in malocclusion. Similarly, an absent member has an effect upon other units through the contact relationship of teeth in the same arch. A missing tooth also affects the opposing denture through the occlusal inter-locking of surfaces when the jaws are closed. In this way a defect in one area may have an effect in a distant region.
>
> Also the axial relation of the teeth is important because of the distribution of the forces generated in mastication. A child may use from 50 to 150 pounds of pressure in mastication. If the teeth were so placed that their axes were vertical as the mandible is carried to the maxilla, the interaction of forces would be equal and opposite. But there is an anterior inclination of the dental axes, varying somewhat according to racial pattern, which leaves a vector of the masticatory force in an anterior direction. This mechanical factor tends to drive both dentures forward in proportion to the degree of inclination and the power of muscular contraction.
>
> As we come to appreciate the ease with which the teeth may be shifted in their bony support, we are in a better position to understand the importance of the soft tissue pressure which affects the integrity of the dental arches. The tongue within, and the facial musculature externally, exert a very significant influence upon arch form.
>
> Without the necessity of further detail, enough has been suggested to indicate the mechanism of the very delicate balance which must be established and maintained to assure normal functional and esthetic configuration of the dental arches.

The introduction of extraneous forces, such as those in thumbsucking, almost always disturbs this balance and alters the form of the dental arch. Whether this is a serious handicap to the person depends upon two things: whether the displacement will be beyond the financial ability to obtain mechanical correction, or whether there is a possibility of recovery

6. Noyes, Harold. Round table discussion on sucking habits and deformities of dental arches. J. Pediat. 17:122 (July) 1940.

through natural agencies in the interval when the detrimental forces are not active or have been discontinued.

It must be kept in mind, as Brodie, Wylie and Broadbent in their cephalometric studies show, that the teeth and alveolar bone are affected primarily. The deep anatomic structures remain unchanged from local pressures.

THE PSYCHOLOGICAL ASPECT OF THE PROBLEM

Freud[7] pointed out that the anatomic structure of those areas of the body surface, such as lips, where skin and mucous membrane meet, have a particular type of sensitiveness of an itching nature which can be removed or quieted only by a rhythmical scratching movement such as sucking.

This sensitiveness is present at birth. It is known that many fetuses suck their fingers in the uterus, make sucking motions while being born or begin to suck immediately after birth. This sucking is for pleasure and is not due to hunger, because hunger does not develop until after 24 hours following birth. Babies often suck nonnutritive objects such as their fingers and bedclothes even after a full meal when they are no longer hungry. This indicates that almost all infants must do a certain amount of sucking in order to satiate themselves.

Levy[4] recorded experiments to prove that thumbsucking was due to insufficient sucking during feeding. He described experiments with chicks which showed that those that were not allowed to peck on the ground pecked feathers off their bodies. He also fed a litter of puppies with a medicine dropper so that they had no chance to suck during their feedings. The puppies acted as babies do who do not get enough chance to suck at feeding time. They sucked their own and each other's paws and skin so hard that the fur came off.

The question not answered by Levy after this portion of the experiment is, "Would these now empty habits of perversion be continued." In other words, if the experiment took enough time to firmly establish these habits in the chicks and puppies and then the chicks were at last allowed to peck on the ground and the puppies allowed to suck normally, would either of these groups of creatures again act like the normal controls? The chances are they would not as environmental adaptations are difficult to abolish. Through habit these tendencies would be too strongly established.

Some allergists believe that thumbsucking arises in connection with respiratory difficulty; that a nasal obstruction or an allergy or a combination of the two may be partially relieved through pressure on the anterior portion of the palate.

Benjamin Spock[8] states that thumbsucking in the early months of an infant's life is not a habit but shows a need. Either more feedings are indicated or the length of time of the feedings should be increased. In general, the sucking instinct is strongest in the first six months, but the sucking urge seems to vary from family to family.

According to Spock, babies that suck before eating may only be hungry. It is when a baby tries to suck his thumb just as soon as his feeding is over, or between meals, that ways to satisfy the craving must be sought.

Spock feels that breast-fed babies are less apt to be thumbsuckers than bottle-fed babies. The reason is simply that since the mother cannot tell how much milk the breast-fed baby is getting, she allows him to suck at the breast as long as he wants. With the bottle-fed baby, his mother takes the bottle away when the milk is gone lest he suck and swallow air.

7. Freud, Sigmund. Three contributions to the theory of sex, ed. 3. Washington, Nervous and Mental Disease Publ. Co., 1918, p. 117.

8. Spock, Benjamin. The common sense book of baby and child care. New York, Duell, Sloan & Pearce Co., 1946, p. 137-144.

With the bottle-fed baby, thumbsucking is most likely to begin at about the time he finishes his bottle in 10 minutes instead of in 20.

A movement of the other hand often accompanies the sucking act. This movement has been called an accessory movement, and has been traced to movements that were made by the free or occupied hand while at the breast or bottle. Such movements may become so integrated in the pattern of the sucking act that the sucking cannot continue without them. For example, consider the child whose accessory movement while thumbsucking was holding an object. When the object was removed, the thumb left the mouth. Or, as in the case of a child who sucked its thumb only while feeling silk, the accessory movement was traced to movement of the finger on the silk wrapper which the mother always wore when she fed the infant at the breast.

B. J. Johnson, observing the ease with which thumbsucking is started, also noted that there is an association with the desire for food. She came to the conclusion that the habit may easily be formed if periods of hunger are prolonged.

Thumbsucking of the infant is not the immediate concern of the dentist,[9] particularly if no apparent physical effect is produced on the teeth and jaws. In infancy, it is the pediatrician who is concerned with the thumbsucking as an aid to interpretation of the child's home life. It is usually interpreted as a problem of feeding, an expression of insecurity, or a sign of unhappiness.

The normal preschool child, from 2 to 5 years of age, may occasionally suck his thumb, particularly when fatigued. When the thumbsucking appears as a persistent damaging habit it should be judged differently from an infant's sucking.

Most psychiatrists hold that thumbsucking is merely one symptom of a disturbed psychic balance.[10] Treating the symptom alone is not considered a proper practice because they feel that the underlying condition may manifest itself in some other manner perhaps more harmful than thumbsucking. They believe that when a child's emotional difficulties are straightened out, the thumbsucking will cease. Their procedure is usually to secure a psychiatric history of the child and of the child's family. They check his physical condition and note if some physical handicap is the reason behind his mental state.

Some psychiatrists[11] advise the use of toys of a rhythmic nature to satisfy the desire of the child for the rhythmic sensation which he gets from sucking. They disapprove of any attempt to forcibly stop the habit with such devices as mitts, splints, bandages and so forth. When such devices are used, they feel, no account is being taken of the mechanisms of habit formation or reformation, and feelings of shame and rebellion may develop in the child.

Not all psychiatrists agree with the Freudian theory of the sexual nature of thumbsucking. Thom[12] is of the belief that a persistence of the habit in older children is a symptom of immaturity which may be either intellectual or emotional. For treatment he suggests restraint, but only with the child's consent and cooperation. However, he advises against restraint in neurotic children or children whose mental state needs adjustment, as restraint would produce physical resistance and the mental rebellion on the part of the child would increase his general nervous instability.

Some psychiatrists say that at times thumbsucking may be an infantile (retrogressive) reaction, and is used by the child as an early method of withdrawing from the outside world. The child gives

9. Massler, Maury, and Wood, Arthur W. S. Thumbsucking. J. Den. Children 16:1 (1st Quart.) 1949.

10. Diskin, Leon. Should thumb-sucking be forcibly prevented? J. Den. Children 9:110 (4th Quart.) 1942.

11. Watson, Maud E. Children and their parents. New York, F. S. Crofts & Co., 1932, p. 362.

12. Thom, D. A. Everyday problems of the everyday child. New York, D. Appleton & Co., 1927, p. 349.

up a later stage of development to go back and pick up an earlier pleasure. He is withdrawing from the outside world and is concentrating on himself. It might be mentioned here that after successful correction of the thumbsucking habit alone, a definite improvement has been noticed clinically in the aggressive personality of many children. Some hold the opinion that the harm occurs in those instances in which the absorption is sufficiently great to prevent normal interest in other activities or even in ordinary learning.

The thumbsucking child is often referred to as a "good" child, because he keeps out of mischief, and in this way becomes unnoticed, but there is also the child who sucks his thumb to attract attention from the mother. It has been found that a great majority of thumbsuckers are siblings; an only child is less apt to be a thumbsucker. If one child in the family is sickly and requires almost constant attention from the mother, the other child may often be a thumbsucker.

Spock[8] states there is no more logic in aluminum mitts than there is in putting adhesive tape across the mouth to cure the baby of hunger. Also he says that the cure is doubtful, because following removal of the restraint, the thumb may pop back into the mouth. Some dentists, for fear of frustrating a child, never use a restraint unless a child actually requests it.

It is on the subject of frustration caused by the attempt to prevent thumbsucking that psychiatrists disagree with one another to the greatest extent. Does restraint cause psychological or mental harm? Is it really a frustration? How dangerous are frustrations? Is thumbsucking a sexual manifestation? If so, can it be a predisposing factor to a future habit of excessive masturbation? Is there such a thing as excessive masturbation?

Of course the prevention causes a frustration. But the following factor may be overlooked. A child, in order to become an acceptable being in society, must have certain other tendencies curbed. This fundamental training involves many frustrations, some serious. Yet it is generally assumed that these natural behavior patterns must be curbed or stopped. From many possible examples which could be used for illustration, a few may be cited. The child must not (1) empty his bowels or bladder except in designated places and in private; (2) handle his private parts in public; (3) steal; (4) lie; (5) manifest hate openly for persons; (6) have temper tantrums, no matter how well justified, or (7) put all available objects in his mouth.

Each of the training processes involving these acts, and countless other unmentioned performances, are to a great degree frustrations. Since it is natural for an infant to put most available matter into his mouth, the stopping of this act is a frustration of a natural behavior pattern.

Compared to the intensity of frustration involved in the aforementioned necessary frustrations, the correction of thumbsucking hardly bears mentioning. It is by no means capable of disturbing the psychic balance to as great an extent as some of these. Yet, this habit is not tampered with because of fear of frustration alone. And it is this habit which produces a penalty of subsequent deformity out of all proportion to the crime.

THE DENTAL ASPECT OF THE PROBLEM

Of all mouth habits, thumbsucking is the most widespread as well as the most obvious.[13] It does harm because malocclusion or facial deformity may be produced by interference with normal pressure forces and by the production of abnormal ones. Since, mechanically, teeth are moved to desirable positions by light pressure stimuli, it follows that pressure

13. Chandler, T. H. Thumb-sucking in childhood as a cause of subsequent irregularity of the teeth. D. Cosmos 20:545 (Oct.) 1878.

Fig. 1 • Dentition of woman about 30 years of age with history of prolonged thumbsucking. Habit was broken at six years of age

stimuli produced by habits may just as easily deform. The type of deformity that a specific habit has produced or may produce can be determined by observing the act and noting the direction of the pressures.

Perhaps the dental disturbance caused by prolonged thumbsucking is a labial displacement of the maxillary teeth[14]—at times the whole anterior alveolar process of the maxilla is forced forward—and the lingual displacement of the corresponding mandibular teeth (Fig. 1). A more complete list of the ill effects attributable to the habit, as suggested in an enumeration by Charles A. Sweet,[15] is as follows:

1. Thumbsucking causes abnormal development of the maxilla or the mandible, or both, depending on the position of the thumb in the child's mouth.

2. The habit leads to mouth breathing which in turn promotes an underdevelopment of the nose and upper lip. The mechanism here is simply that thumbsucking causes a pulling of the premaxilla. This causes a high palatal vault with resulting deviation of the nasal septum; the result is mouth breathing.

3. It diminishes the important gag reflex. This occurs almost universally in thumbsuckers.

4. Thumbsucking is responsible for many open bite deformities by acting as a predisposing factor for a tongue-thrusting habit (Fig. 2). This deformity in time becomes ugly and requires extensive and costly orthodontic treatment to correct. The psychic damage of the uncorrected open bite is inestimable. An open bite condition usually leads to a short underdeveloped upper lip. A mouth breathing habit can result which in turn, tends to inhibit chest development. Also, mouth breathers are more subject to respiratory infections because causative agents are not filtered by the hairs of the nasal membranes.

5. The habit is considered a factor influencing the overgrowth and enlargement of tonsils.

14. Jossen, W. Bad habits as etiological factors and their treatment. (Abst.) D. Cosmos 56:1276 (Nov.) 1914.

15. Sweet, Charles A. Thumb and finger-sucking by children. Am. J. Orthodont. 34:1017 (Dec.) 1948.

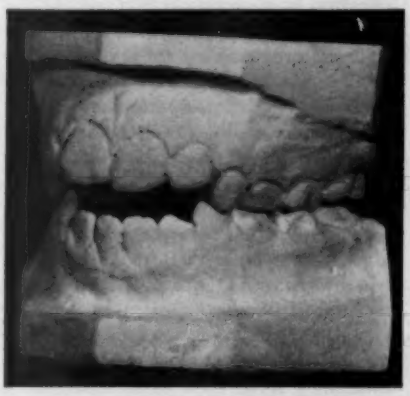

Fig. 2 • An open bite condition which is maintained by a tongue-thrusting habit during swallowing. This occurrence is often the result of a thumbsucking habit

6. It nearly invariably displaces teeth.

7. Thumbsucking frequently causes callous formation on the thumb and continued wetting of the thumb by saliva may cause a dermatitis.

8. It causes constriction of both dental arches.

9. The central incisors, because of being displaced anteriorly to their normal positions, are much more vulnerable to fracture resulting from a blow or fall.

10. Speech defects may result since an excessively high vault has been created and teeth have been displaced.

11. It creates difficulties for satisfactory artificial teeth replacement in adult life when and if the teeth are finally lost.

12. It might also be mentioned that as a child sucks his thumb, he may habitually hook his forefinger over his nose as a kind of finger rest. This may produce a saddle-nose effect which is extremely disfiguring.

Thumbsucking is recognized by dentists to be a habit which can cause bodily damage, but by no means do they find all malocclusions traceable to it, nor do they infer that a perfectly occluded dental mechanism is to be acquired by simple correction of thumbsucking alone. About 17½ per cent of all individuals who present a malocclusion reveal a clinical history of thumbsucking.[16] Even of these it cannot be said definitely that some might not present a malocclusion regardless of the occurrence of the habit. But it can also be said that in every case where the habit has persisted from infancy to at least the age of 3 years, a malocclusion is almost sure to be evident at that time. In Swinehart's study,[17] he noted an occurrence of a maxillary protrusion in 89.4 per cent of the habituates. He also observed that instances of open bite are rare unless they have been associated with a predisposing thumbsucking habit.

To adequately carry on the work of prevention of malocclusion, the dentist should be prepared to control the definite factors in the development of a normal occlusion. To do so requires observation and guidance of the child from birth.

EVALUATION OF THE PROBLEM

Many misleading articles and statements have been written regarding the effects of thumbsucking.[18] Often these conclusions have been based on studies which go only halfway. It is unfortunate when these statements are made available to the general public, for it sets up a false sense of security among parents which is responsible for the innocent neglect of these habits. The statement that the discontinuance of thumbsucking after the fifth year of life leaves little likelihood of a permanent malocclusion[19] is pointed out by those psychiatrists who advise against an interference with the habit. This is true only in those instances in which normal lip function acts as an appliance and corrects the malocclusion.[20] This can happen only where the pressure on the incisors when sucking the thumb has been in an upward direction and the malocclusion is a Class 1 Angle malocclusion. If this normal lip function does not exist after the habit is broken, the malocclusion will in all probability continue with increasing severity. Today it is possible to demonstrate many cases clinically where the children are not over 3½ years of age and apparently have permanent deformities.

Unfortunately the weakness of the psychiatrists' approach is that they have refused to see or believe anything but the psychic picture. They have not granted

16. Johnson, L. R. The status of thumb-sucking and finger-sucking. J.A.D.A. 26:1245 (Aug.) 1939.

17. Swinehart, E. W. Relation of thumb-sucking to malocclusion. Am. J. Orthodont. & Oral Surg. 24:509 (June) 1938.

18. Johnson, L. R. Control of habits in treatment of malocclusion. Am. J. Orthodont. & Oral Surg. 24:909 (Oct.) 1938.

19. Lewis, S. J. Thumb-sucking; a cause of malocclusion in deciduous teeth. J.A.D.A. 17:1060 (June) 1930.

20. Johnson, L. R. Habits and their control during childhood. J.A.D.A. 24:1409 (Sept.) 1937.

that a habit once created may persist even if the original causative factors have long since disappeared. They have been slow to accept that irreparable physical damage can be the result of such a pernicious habit.

In one recent book on psychiatry, the authors[21] devote much space to the inadvisability of interfering with a thumbsucking habit. They write of the "superstition that it will deform the child's mouth." They claim there is no proof that thumbsucking deforms the mouth or jaws except under the most unusual circumstances. Hence, they advise the physician never to interfere with the habit. "If the parent is dissatisfied" at a physician's ordering them to ignore a thumbsucking problem, "and the doctor loses the case, he can comfort himself with the assurance that he has been honest and correct in what he has done."

As has been mentioned already in this paper, Sweet, Johnson, Swinehart and many other dentists who have a collection of study casts assert that thumbsucking often causes considerable permanent damage. These men are making provable statements pertaining to their field. But English and Pearson,[21] who are not dentists, make a statement pertaining to the dental field which they cannot substantiate and which is untrue.

Let us make an assumption for the purpose of comparison. Let us suppose that all newborn infants had a tendency to put their fingers to their eyeballs. These tendencies always gained in intensity and frequency, and an eye-fingering habit developed. Resulting iritis was common. Let us further assume that many children as young as 2 years old have suffered irreparable damage of one eye or both from such a cause. There would not be a physician or psychologist in this nation who would justify continuance of such a pernicious habit, even if the stoppage did cause a minor frustration.

But the damage caused by thumbsucking is also serious and much more subtle. Many who permit continuance of thumbsucking are oblivious of its deforming effects.

TREATMENT OF THE PROBLEM

The treatment, of course, is preferably psychological. A feeling that he is loved and is secure should be instilled in the young child. Local treatment should be attempted only when a child appears to be psychologically well adjusted, and when the child comes from an environment free from tension. The thumbsucking should appear to be merely a habit prolonged beyond the need which originally caused it. A dentist should always refer an obviously poorly adjusted child to those most fitted to deal with him. But when the thumbsucking has been established as an empty habit, it should be treated locally. Local treatment may be divided into the following:

1. Negative training by the parent. The parent takes the thumb out of the child's mouth or repeatedly reminds the child to do so. This is often not successful.

2. Positive training by the parent. The parent forces the child to suck his thumb until the child yearns to remove it from his mouth. This is often done with the child in front of the mirror. It can only be done on older children and is often not successful.

3. Ill-tasting medicines locally applied to the thumb. This is for very young children, as older children will simply wash it off. This also is often not successful.

4. Finger guards,[22] braces, gloves, closed sleeves, elbow splints and similar removable appliances. These are to be used only on young children if used at all.[23] These are the most condemned of

21. English, O. Spurgeon, and Pearson, Gerald H. J. Emotional problems of living. New York, W. W. Norton & Co., 1945.

22. Anderson, W. W. Thumb-sucking apparatus. Am. J. Dis. Child. 39:70 (Jan.) 1930.

23. McBride, W. C. Juvenile dentistry. Philadelphia, Lea & Febiger, 1941, p. 292-295.

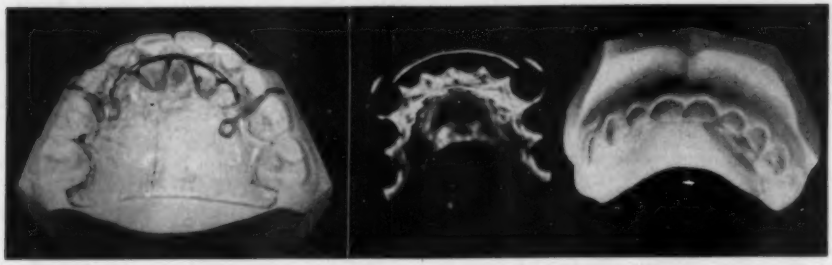

Fig. 3 • Left: Removable "staplate" showing how palatal crib may be included in its design. Appliance shown on construction model. Right: Removable "staplate" shown beside construction model

the treatments listed and often are not successful.

5. Intraoral appliances.

Removable appliance:

Removable "staplate" (Fig. 3). This is not too successful as the child can take the appliance out of his mouth at will. Hence the child does not get used to it, and it continues to be a disturbing foreign body in the mouth.

Nonremovable or constant appliances:

Nonremovable palatal bar[24] (Fig. 4, left). This device is cemented to the teeth by means of single or double bands. It simply breaks the suction during thumbsucking. This appliance will not break the thumbsucking habit of a very persistent child, because the child can keep his thumb passively in his mouth.

Nonremovable palatal crib (Fig. 4, right). This device is similarly cemented to the teeth. Although it is usually successful, it is difficult to fabricate, and it does not always adequately inhibit the frequent thumbsucking sequela of tongue-thrusting.

Nonremovable "hay rake" (Fig. 5). This device is similarly cemented to the teeth. It presents a series of tines which act as a fence to prevent thumbsucking and tongue-thrusting. The ends of the tines constantly remind the tongue to keep behind the appliance. The device has the double misfortune of looking vicious and being called by the aforementioned distasteful name. Used properly, it has proved itself benign. It is always successful. Figure 6 illustrates a successful treatment of a case.

It has been repeatedly observed clinically that whatever change may take place in the child's personality and psychological makeup following treatment, the change appears to be a favorable one.

Following the successful treatment of 15 cases, the following questions were asked the children:

1. Are you "mad at" Mother and Daddy for bringing you here? (Yes, 2; no, 13.)
2. Are you "mad at" me for putting this thing on your teeth? (Yes, 2; no, 13.)
3. Was it awfully hard getting used to? (Yes, 5; no, 10.)
4. Do you miss sucking your thumb? (Yes, 1; no, 14.)

The parents were asked the following questions:

1. Does Johnnie seem as happy as he was before treatment? (Yes, 15; no, 0.)
2. Does he enjoy the company of other children more or less than he did before treatment? (More, 15; less, 0.)
3. Is he quicker to join the games of other children than he was before treatment? (Yes, 15; no, 0.)

24. Brauer, J. C., and others. Dentistry for children, ed. 2. Philadelphia, The Blakiston Co., 1947, p. 110, 142-143.

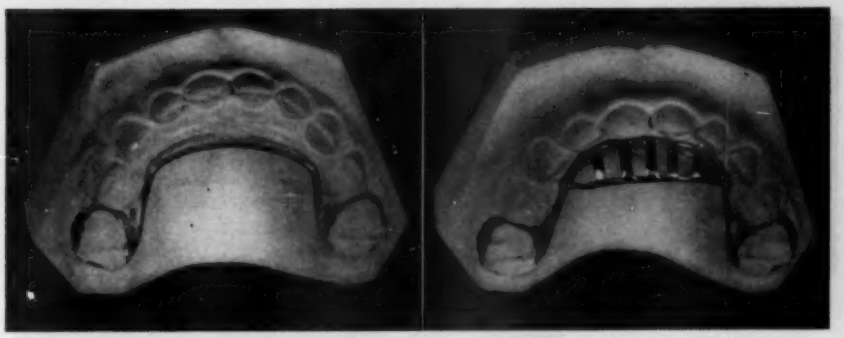

Fig. 4 • Left: Nonremovable palatal bar. Right: Nonremovable palatal crib

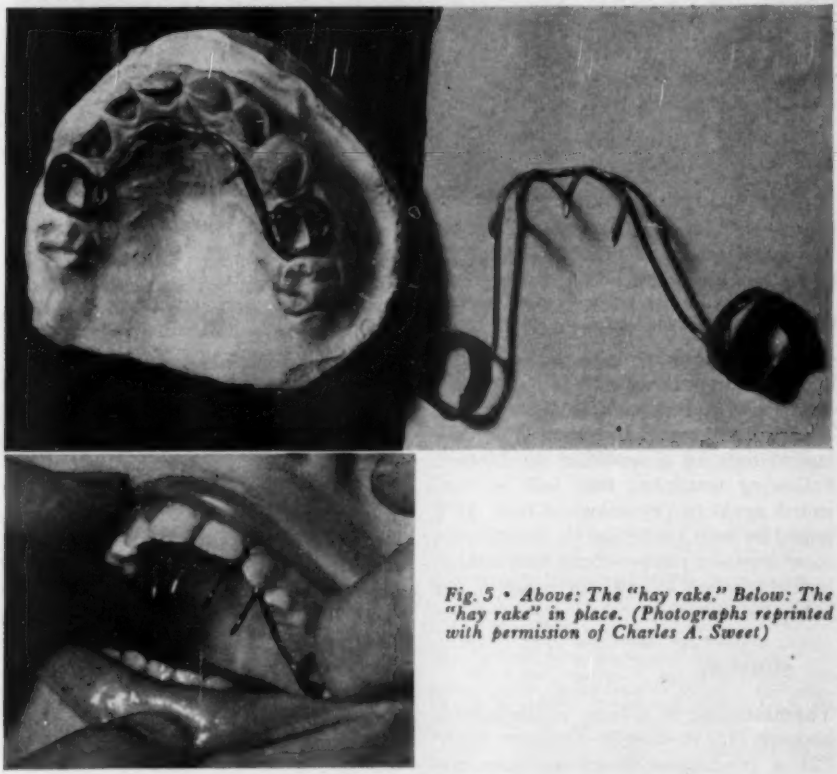

Fig. 5 • Above: The "hay rake." Below: The "hay rake" in place. (Photographs reprinted with permission of Charles A. Sweet)

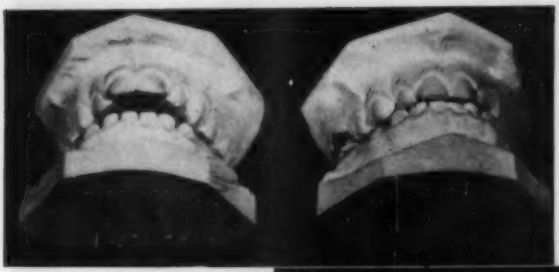

Fig. 6 • Left: Before and after stoppage of thumbsucking habit by means of a constant appliance. Treatment was begun in January and completed in August of the same year

Right: Improved position of teeth as a result of breaking sucking habit by means of appliance. Note that no mechanical forces were applied to the teeth

4. Does he appear more aggressive than he did before treatment? (Yes, 13; no, 2.)
5. Have any other habits become evident since treatment began? (Yes, 1; no, 14.)

This crude questioning will be replaced in our future dealings with thumbsucking children who are to have local correction. They are to be given some valid psychological tests by a qualified psychiatrist. Following treatment they will be subjected again to psychological tests. It is hoped by such procedure to determine a more accurate picture of the true psychological reaction to local correction of the habit.

SUMMARY

Thumbsucking as a habit is undesirable because (1) it directly displaces teeth; (2) it predisposes to serious secondary mechanical damage; (3) it interferes with learning and group activities, and (4) it worries the parent as to what, or what not to do.

Correction should always be attempted, but only in the following manner:

1. If an emotional need is present, the habit should be treated psychologically until the child is 3½ years of age.

2. Home treatment should assure the child of adequate affection, amusement and a feeling of security.[25]

3. After the child is 3½ years old, especially if the thumbsucking is an empty habit, it should be treated with a nonremovable intraoral appliance such as a palatal crib or a "hay rake." Such appli-

25. Lubit, E. C., and Lubit, Esther. Psychological and dental aspects of thumb-sucking. D. Items Interest 70:279 (March) 1948.

ances will aid in the correction of secondary mechanical damage such as open bite and also aid in preventing tongue-sucking and tongue-thrusting.

CONCLUSION

The problem of thumbsucking should be corrected by the parent and the pediatrician. If the habit has not been corrected by the time the child is 3½ years old, it should be determined if the habit is meaningful or empty. If it is an empty habit, it should be corrected by a qualified dentist.

If further psychological needs become evident, the child should be referred to a psychiatrist. The psychiatrist should institute corrective treatment, and, if necessary, refer the child back to the dentist for final correction.

It is hoped that the team of parent, pediatrician, dentist and psychiatrist will work together to insure a greater percentage of normal masticating mechanisms in our children.

A basic study of the chewing forces of a denture wearer

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Measurements of the maximum biting force have shown that a denture wearer on the average can exert only about 15 per cent of the force of a person with a natural dentition.[1,2] This raises the question as to whether denture wearers have enough masticatory force to chew adequately. Indirect evidence that the masticatory performance of persons with artificial teeth is often unsatisfactory has recently been presented.[3] It is also common experience that denture wearers who have well-fitting, comfortable dentures may encounter difficulty in chewing certain foods. With this in mind, it was decided to apply a newly developed, highly sensitive method[4] and study the forces used during chewing by a person in good health who had been wearing dentures for a period of six years. It was hoped that such a study might lead to an increased understanding of the mastication of denture wearers, and that the method developed for the study might provide a useful tool for improving the design of prosthetic appliances and artificial teeth.

REVIEW OF THE LITERATURE

In reviewing the literature, it was found that many attempts have been made to evaluate the masticatory forces, but that

This work was done in the oral physiology laboratory of Tufts College Dental School and was supported by a grant from the Office of Naval Research.

Director of research at the Eastman Dental Dispensary, Rochester, N. Y.

1. Klaffenbach, A. O., Gnathodynamics. J.A.D.A. 23:371 (Mar.) 1936.

2. Manly, R. S., and Vinton, Paul, Factors limiting chewing ability by denture wearers. Unpublished.

3. Green, H. T.; Dreizen, S., and Spies, T. D., A clinical survey of the incidence of impaired masticatory function in patients of a nutrition clinic. J.A.D.A. 39: 561 (Nov.) 1949.

4. Howell, A. H., and Brudevold, F., A method for measuring the vertical forces used during chewing of food. J. D. Res. To be published.

there have been no measurements of the forces which are used during actual chewing. Black[5] believed that the masticatory force would exceed the minimum force which was required to pulverize food. He crushed food between two upper and lower molars with a lever type instrument, and found crushing forces for meat in the range 5 to 90 pounds. Head[6] and Schroeder[7] used a similar experimental approach, and found that smaller forces were required when the crushing was done by a shearing movement than when accomplished by a straight compression using a hinge movement. Klatsky[8] had persons attempt to chew upon a gnathodynamometer with a force which they thought they used during mastication of food. He found that the force used was only one-fourth of the maximal force which they could exert on the instrument.

PRESENT METHOD

The experiments previously mentioned were done under artificial conditions, and their clinical significance is, therefore, limited. The method used in the present investigation[4] permits measurements of the vertical forces in the mouth of a denture wearer during normal comfortable chewing. The principle is to insert small strain gages or force measuring devices under individual artificial teeth to form bite elements which are cemented into the denture base in proper occlusion. The bite element is elastic and will be slightly compressed when a force is exerted on the tooth. This compression changes the inductance of a coil in the bite element. The change is transformed in associated electronic equipment and is recorded as a wave on a moving slip of paper.

Figure 1 shows individual teeth with attached strain gages, and a set of dentures with four of these teeth mounted in the upper denture. Figure 2 shows the patient with the denture in place and the associated recording system. Simultaneous readings from three bite elements may be taken with this equipment. A sample of the kind of record obtained in chewing a mouthful of raw carrot is shown in Figure 3. Each wave in the chart represents one chew. Time is recorded in the horizontal direction, and the magnitude of the force of each chew

5. Black, G. V., An investigation of the physical characters of the human teeth in relation to their diseases, and to practical dental operations, together with the physical characters of filling materials. Den. Cosmos 37:469, 1895.

6. Head, J., The human skull used as a gnathodynamometer to determine the value of trituration in the mastication of food. Den. Cosmos 48:1189, 1906.

7. Schroeder, H., Lehrbuch der Technischen Zahnheil-Kunde, Band 1, Berlin: Herman Meusser, 1925, p. 226.

8. Klatsky, M., Food and food mastication as external environmental factors in the causation and prevention of dental caries. Den. Cosmos 78:814 (Aug.) 1936.

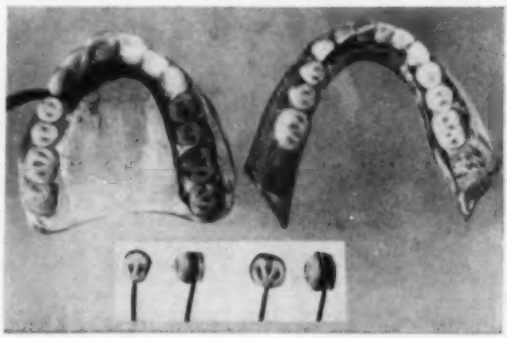

Fig. 1 • Individual teeth with strain gages attached. Also a set of dentures with four of these teeth mounted in the upper denture

Fig. 2 • Patient with the denture in place and the associated recording system

is indicated by the height of the individual waves. The rising part, only, of each wave is a recording of the chewing force, and this ascending slope is an index of the rapidity with which the force is applied. The descending part of the wave is a recording of the strain gage resuming its original shape after the chewing force has been released.

This method opens new possibilities for studying intraoral functional forces in the field of prosthetic dentistry. For instance, the chewing force a person uses may be studied in relation to the size and shape of artificial posterior teeth, or in relation to the supporting structures of full and partial dentures. The load transmitted to abutment teeth and alveolar ridges by different types of prosthetic appliances may be determined, and the force required to chew foods of various physical properties may be investigated.

SCOPE OF PRESENT STUDY

The present study is concerned with measurement of the vertical forces which a denture wearer exerted in chewing a variety of foods. Nonanatomic posterior teeth were used and measurements were taken on the upper left first and second bicuspid and the first molar. The patient was asked to chew on the test side only, and was given no other instruction. The data were evaluated by adding all the forces exerted on each tooth individually during chewing of a mouthful. This sum indicated how much each tooth was actually used in masticating the food. The average force of a chew was calculated for each tooth, and an attempt was made to find the occlusal pressure on each tooth by dividing the average force by the approximate occlusal area which was used during chewing. In the conclusions drawn, consideration was given to the movements of the jaw and the force with which the opposing teeth made contact during chewing.

In all, 19 different foods were tested, including several types of meat, a few fish and cereal foods, and some fruits and vegetables. The meats tested were sirloin steak, broiled ham, pork chop, bacon, corned beef, veal cutlet, braised beef, fried liver and shoulder of beef. The fish included swordfish and scallops; the cereals, All-bran and Grapenuts. Of the vegetables, raw carrot, raw celery, and lettuce, and of the fruits, raw apple, dried apricot and shredded coconut were tested.

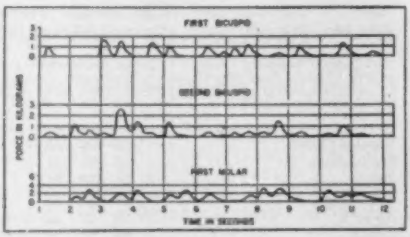

Fig. 3 • Sample recording obtained on different teeth in chewing a raw carrot. Each wave in the chart represents one chew

RESULTS

Because many of the foods gave similar results, only a few representative data will be reported. All data represent the average of three tests.

In Table 1, the findings are tabulated for some foods as follows, from left to right: the number of chews (force recordings) on each of the two bicuspids and the first molar, the sum of all the forces exerted on each of these teeth, the sum of the forces exerted on all the teeth, and the average force on each tooth. It will be seen that the number of chews is greater for shoulder of beef and the raw carrot than for the other foods. The patient complained of a difficulty in chewing these same foods. It is interesting to note that in chewing the very tough shoulder of beef, the number of chews on the second bicuspid was greater than the number on the molar. For the brittle carrot, on the other hand, the number of chews for the first molar and second bicuspid were the same, but the chews on the first bicuspid numbered less.

The total force required to chew a mouthful of the different foods is shown in column 7. It will be seen that most foods require a total force within the range of 73 to 100 Kg. Although raw carrot and shoulder of beef required about three times more total force than the other foods, this extra force was obtained by a greater number of chews rather than by increased force in a single chew. This is shown in columns 8, 9 and 10 of Table 1. The highest mean force on the first molar was 1.56 Kg., which was for raw carrot, and the lowest was 0.63 Kg. for dried apricot. The mean force for the different foods varied even less on the bicuspids. It is obvious that a denture wearer avoids using great force during chewing, and that he compensates by increasing the number of chews.

DISTRIBUTION OF FORCE

It appears from columns 4, 5 and 6 in Table 1 that the forces on the first molar were greatest in all instances except in the chewing of shoulder of beef, sirloin steak, and dried apricot. For these foods, the forces on the second bicuspid were greater than those observed on the first molar. The utilization of the individual teeth in chewing different foods is demonstrated more clearly in Table 2, which shows the percentage distribution of force on each tooth. It will be seen that while generally most of the chewing is done on the second bicuspid and first molar, when the toughest of foods are attacked the first bicuspid is brought conspicuously into play. In chewing dried apricot the first bicuspid exerted 27.6 per cent of the total force; in chewing sirloin steak, 24.2 per cent. The corresponding figures for

Table 1 • Number of chews on first bicuspid 4, second bicuspid 5, and first molar 6 during a mouthful. The tota force exerted on each tooth and on all the teeth and the mean force on each tooth

Food	No. of chews			Total force (Kg.)				Mean force (Kg.)		
	4	5	6	4	5	6	All teeth more than	4	5	6
Shoulder beef	x	103	58	x	121.0	50.0	171.0	x	1.17	0.87
Broiled ham	25	29	31	18.0	35.0	46.0	99.0	0.70	1.20	1.49
Sirloin	31	33	35	24.0	38.0	36.0	98.0	0.77	1.15	1.03
Pork chops	26	29	32	13.0	32.0	44.0	89.0	0.51	1.10	1.39
Apricot	38	32	36	20.0	30.0	23.0	73.0	0.53	0.92	0.63
Apple	24	21	23	14.0	26.0	37.0	77.0	0.57	1.24	1.16
Carrot	68	89	89	42.0	90.0	139.0	271.0	0.62	1.00	1.56
Celery	28	32	32	17.0	40.0	43.0	100.0	0.62	1.23	1.35

x—Data lacking due to breakage of strain gage.

the molar were 31.4 per cent and 37.0 per cent respectively. On the other hand, in chewing apple, broiled ham and raw carrot, the first bicuspid exerted only from 15.6 per cent to 17.8 per cent of the force, and the first molar provided from 48.2 per cent to 51 per cent. These results are in agreement with preliminary findings[4] which suggested that tough foods are shifted forward toward the first bicuspid during chewing, and that other types of food are chewed to a greater extent on the first molar. The second bicuspid tends to be more consistently used in the mastication of all types of foods.

The greatest force recorded on all the teeth in a single chew was 8.5 Kg. which was obtained in one of the initial bites on raw celery. The corresponding figure for carrot was 7.8 Kg. and for apple 6.2 Kg. Most meats had the greatest reading within the range of 4 to 6 Kg. Of the different teeth, the first molar had generally the greatest maximal reading. The highest recording for the molar was 5 Kg. which was found in chewing carrot and celery. Carrot also gave the greatest force recorded on the second bicuspid, 4 Kg., and on the first bicuspid, 2.3 Kg.

In one instance a food was tested at a time when the test subject had a sore spot on the lower ridge in the area of the first molar. The same food was tested under normal conditions, and it was shown that the sore spot reduced the chewing forces on the molar by more than one half, and the forces on the second bicuspid by about 20 per cent. This clearly demonstrates the importance of comfortable dentures for the efficiency of the masticatory function.

Table 2 • Percentage distribution of force on the different teeth

Food	No. 4	No. 5	No. 6
	%	%	%
Dried apricot	27.6	41.0	31.4
Sirloin steak	24.2	38.8	37.0
Apple	17.8	34.0	48.2
Broiled ham	17.7	35.8	46.5
Carrot	15.6	32.4	51.0

OCCLUSAL PRESSURE

A discussion of chewing forces should include a consideration of the occlusal surfaces of the teeth. Teeth with small occlusal areas will cut with smaller force than those with greater area. The factor to consider is not force alone, but occlusal pressure or force per unit occlusal area. The entire occlusal area is not necessarily exposed to force during chewing. The force would be exerted on that part of the occlusal area which comes in contact or nearly in contact with the opposing teeth when the jaws close. This area would vary depending on the extent to which a lateral stroke is used in mastication. A method, utilizing light penetration through a check bite in black wax, is available for measuring the occlusal contact area in centric occlusion.[9] These areas were found to be 3.5, 6.5, and 14 mm. for the first and second bicuspid and the first molar respectively. A rough estimation of the occlusal pressure used in chewing different foods may be obtained by dividing the mean force exerted on the individual teeth (Table 1) by these areas. Table 3 shows that the occlusal pressure calculated in this way is much higher on the bicuspids than on the first molar. The actual difference in pressure is probably less than indicated in Table 3, due to the increase in occlusal contact area caused by the lateral excursion of the mandible in chewing. Nevertheless, it must be concluded that the bicuspids with their higher force per unit area are better cutters than the molars.

DISCUSSION

In considering the relation of the chewing force to the physical properties of foods,

9. Yurkstas, A. and Manly, R. S., Measurement of occlusal contact area effective in mastication. Am. J. Orthodont. 35:185 (Mar.) 1949.

Table 3 • Pressure on the different teeth calculated on the assumption that chewing occurs with a hinge movement

Food	Kilograms per mm²		
	4	5	6
Sirloin	0.22	0.18	0.07
Broiled ham	0.20	0.19	0.11
Pork chops	0.15	0.17	0.10
Dried apricot	0.15	0.14	0.05
Carrot	0.18	0.15	0.11

the possibility must be considered that the teeth, after crushing the food, may make contact with the opposing teeth with some force. Black evidently had this idea in mind when he suggested that the chewing force might exceed the force required to pulverize food.[5] In the present study, the forces varied considerably from chew to chew in most instances, and frequently only two of the three teeth tested were exposed to force during a single chew. Therefore, it must be concluded that opposing teeth do not make contact with any appreciable force during chewing.

Since our denture wearer preferred to use small forces in mastication, it would be logical to expect that he might attempt to increase the effect of the force by chewing with a lateral stroke or shearing, rather than with a straight hinge movement. The movements of the jaw were not studied in the investigation, but the figures in Table 4 suggest that a shearing movement was used. In this table, the forces required to crush food by a hinge movement and by a shearing movement as obtained by Black[5] and by Head[6] are compared with the greatest force recorded on the bicuspids and the molar in chewing the same food. Definite conclusions cannot be drawn from these data because of differences in the experiments, and because only three foods were tested by all investigators, but the similarity of the forces required to crush by shearing to the forces actually used in chewing suggests that shearing was used by our subject.

Perhaps the most interesting observation in this study was the high percentage of force exerted on the bicuspids as compared with that exerted on the molar. The fact that these teeth received more force per unit of occlusal area suggests that the food is distributed more consistently on the bicuspids than on the molars during chewing. This poses the question as to whether it might not, in many cases, be advantageous in designing artificial teeth to enlarge the occlusal area of the second bicuspid. This is further supported by the fact that this tooth frequently is placed in that part of the denture which affords most stability, and it has been found that, on the average, a greater biting force can be produced on this tooth than on the other posterior teeth.[1]

The maximum biting force our test subject was able to produce was 4 Kg. on the first bicuspid, 6.8 Kg. on the second bicuspid, and 9 Kg. on the first molar, as measured with a gnathodynamometer. This is demonstrated in Figure 4, which shows the relation of these forces to the maximal forces recorded in normal chewing, and to the average range of force used in chewing different foods. It will be seen that the biting forces recorded on the gnathodynamometer are considerably in excess of any force used in normal chewing. The maximal chewing forces amounted to about one half and the average forces to one sixth or less of the gnathodynamometer recordings. The fact that forces within a narrow range are preferred by a denture wearer

Table 4 • Comparison of forces in kilograms required to crush food with a hinge movement (G. V. Black), shearing movements (Head), and maximal chewing forces

Food	Hinge mov't	Shearing mov't	Chewing mov't
Sirloin steak	16-18	4.5-9	4.5
Broiled ham	18-27	4.5-6	4.6
Pork chop	9-11	11-13	6.3

shows that he is comfortable and feels at ease only when small chewing forces are used.

It should be emphasized that the person tested was in good health and had well developed ridges. His capacity to bite was, therefore, probably above average. It is likely that many denture wearers chew with smaller forces than those recorded in the present case. These findings emphasize the importance of designing artificial teeth which will do the work of mastication with a minimum amount of force.

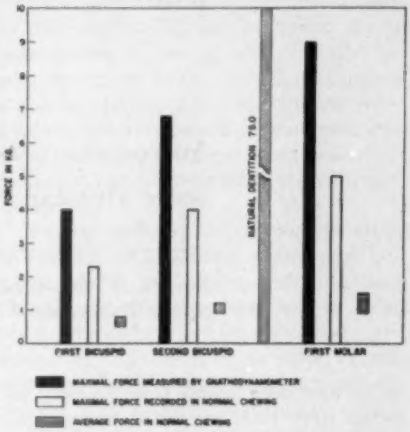

Fig. 4 • Comparison of the maximal biting force produced on a gnathodynamometer, the maximal force recorded in normal chewing and the average range of force used in normal chewing of different foods

SUMMARY AND CONCLUSIONS

1. Measurements of the chewing forces on the two left maxillary bicuspids and the first molar of a denture wearer were made using a newly developed method which permitted measurements to be taken in the mouth during normal chewing.

2. Nineteen different foods were tested, including meats, fish, fruits, vegetables and cereals.

3. The forces required to chew a mouthful of food varied from 72 Kg. for dried apricot to 271 Kg. for raw carrot, with the chewing confined to one side of the mouth.

4. Greater total force was produced by increasing the number of chews, rather than by increasing the force of a single chew.

5. The mean force of a chew was in the range of 0.6 to 1.5 Kg. on the first molar and second bicuspid, with the magnitude somewhat less on the first bicuspid.

6. Tough foods were chewed more on the bicuspids than were other types of food.

7. Sore spots under the denture base will substantially reduce the chewing force.

8. Opposing teeth do not make contact with any appreciable force during chewing.

9. It is probable that generally the chewing was done with a lateral stroke of the mandible since available data from mechanical experiments indicate that the chewing forces were too small to bring about crushing of certain foods with a straight hinge movement.

10. It should be emphasized that the chewing force of a denture wearer is surprisingly small, and, therefore, artificial posterior teeth with a good cutting edge are desirable.

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Aureomycin: its use in the treatment of acute alveolar abscesses in children

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Acute infections arising from nonvital infected teeth have presented many problems to the dental profession through the years as have other acute infections to the medical profession. This was primarily the result of not being able to localize the infection or prevent its spreading to more vital structures. Such serious consequences as Ludwig's angina, retropharyngeal cellulitis, peritonsillar abscess, cavernous sinus thrombosis, acute cervical lymphadenitis, osteomyelitis and septicemia having their origin in an infected tooth were mentioned frequently in the dental literature.

These infections have not occurred as frequently in children as might be expected in proportion to the number of nonvital infected teeth encountered in children's mouths. However, when they do occur, the patient is acutely ill and complications are often rapid in their onset and serious in their outcome.

With the development of chemotherapy, many acute and contagious infections formerly regarded as dangerous became well controlled and of minor concern. Acute alveolar abscesses have followed this trend. Fewer reports of fatality following an acutely infected tooth or treatment of the same appeared in the dental literature. Also fewer patients with complications associated with dental infections were recorded in hospital admission lists.

An effort has been made to compare the clinical course of infections treated by the methods prior to chemotherapy and those treated after. Also, a more recently developed antibiotic, aureomycin, was studied to determine its effectiveness as well as its practicability for use by the dental profession in the treatment of acute alveolar abscesses.

The methods of treatment of acute alveolar abscess used at the Children's Memorial Hospital in Chicago during the past 15 years were evaluated and compared with the methods where systemic antibiotic therapy was used alone.

Aureomycin has been reported to be one of the most versatile antibiotics developed. Experimentally, aureomycin has been found to act *in vitro* as a bacteriostat and, at high concentrations, as a bactericide. It has been found to be effective against a wide variety of pathogens.

Whether given orally or by other routes, including the rectal, aureomycin readily passes into the blood stream maintaining measurable serum levels for as long as 12 hours after oral or intramuscular administration. It then passes into the spinal fluid, peritoneal fluid,

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pleural fluid, bile, urine and milk, thus indicating wide diffusion throughout all the body tissues. The toxicity of aureomycin is very low. Occasionally, some degree of nausea, vomiting or diarrhea has been noted, particularly in ambulatory patients, although it has rarely been necessary to discontinue the drug on this account.

Dosages of 5 to 10 mg. per kilogram of body weight of aureomycin given orally at six hour intervals, ensure the persistence of measurable blood levels. The method of choice for administration is by the oral route. Because of its tendency to irritate tissues, intramuscular injections are not recommended. It is recommended, however, that if aureomycin is given orally over extended periods of time, the possibility of interference with the intestinal synthesis of vitamirs makes it advisable to supplement with vitamins.[1]

The accepted dosage is 25 mg. per kilogram of body weight daily, divided into four equal doses. Full dosage should be continued beyond the time when the temperature becomes normal.[2]

Jacobs and Jacobs[3] reported a series of 25 cases of infections of the oral cavity in which aureomycin was used systemically and locally. Their results were excellent in 16 instances, good in 6 and fair in 3. The conditions treated were acute periostitis, acute subperiosteal abscess, acute herpetic stomatitis and gingivitis, acute suppurative gingivitis, acute submaxillary adenitis, cellulitis, alveolar abscess, diffuse osteomyelitis of the mandible, acute circumscribed osteomyelitis, acute periodontal abscess, subacute infected lymph node, acute osteitis, acute pericoronal abscess and subacute pericoronitis.

Stewart and Roth[4] reported a series of cases where a variety of dental infections were treated by the local applications of aureomycin troches (15 mg.) and cones (25 mg.). No instances of acute alveolar abscess were treated systemically in this particular study. Most of the infections were treated by placing a cone in the socket of the extracted tooth postoperatively or in one instance by placing a cone in the incised opening of a palatal abscess. Their conclusions were that the results obtained with aureomycin were superior to those obtained with penicillin although no statistical evidence is offered.

Because aureomycin is extremely effective when administered orally and because of its low acute, subacute and chronic toxicity, and inasmuch as most organisms do not apparently become resistant to it as they do to some of the other antibiotics, this drug appears to possess certain advantages that would make its use in the treatment of acute dental infections by systemic administration extremely practical.

In view of the favorable reports of chemotherapy, it was decided to determine the clinical efficiency of aureomycin in the treatment of acute alveolar abscess. Also the comparative clinical responses of the various treatments prescribed over the years were studied in order to demonstrate if possible the reason for decreased reports of complications following acute alveolar abscesses.

METHOD OF STUDY

Case histories of children treated at the Children's Memorial Hospital for acute alveolar abscess over the past 15 years were reviewed and summarized as to their method of treatment and course of the infection. The typical symptoms are illustrated in Figure 1. The following data were recorded:

1. Aureomycin, a review of the clinical literature. New York, Lederle Laboratories Division of the American Cyanamid Company, 1950, p. 9-12.

2. Aureomycin, a review of the clinical literature. New York, Lederle Laboratories Division of the American Cyanamid Company, 1950, p. 68.

3. Jacobs, H. G., and Jacobs, M. H. Aureomycin: its use in infections of the oral cavity. Oral Surg., Oral Med. & Oral Path. 2:1015 (Aug.) 1949.

4. Stewart, G. M., and Roth, L. H. The use of aureomycin in oral infections, a preliminary report. J.A.D.A. 40:563 (May) 1950.

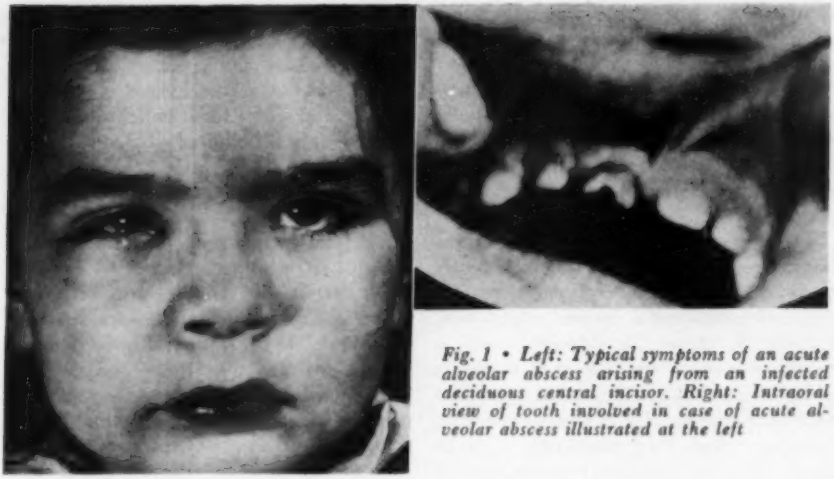


Fig. 1 • Left: Typical symptoms of an acute alveolar abscess arising from an infected deciduous central incisor. Right: Intraoral view of tooth involved in case of acute alveolar abscess illustrated at the left

1. Method of treatment.
2. Temperature: the peak temperature reached at the beginning of or during the course of the treatment.
3. Time in days for the acute symptoms of active inflammation to subside: fever, pain and redness.
4. Time in days as to when the patient recovered from all symptoms of the acute infection: edema, cellulitis, adenitis.
5. Type of bacteria cultured from the point of drainage if reported.
6. Drainage, whether spontaneous or surgical by incision or opening through the root canal of the tooth.
7. Toxic or side reactions.

The methods of treatment in this group of cases were classified into four main groups. They were:

1. Those cases of acute alveolar abscess with typical clinical symptoms treated with hot applications (internally or externally), anodynes, sedatives, fluids and bed rest.
2. Those cases of acute alveolar abscess with typical clinical symptoms treated principally with sulfonamides (sulfanilamide, sulfathiazole, or sulfadiazine by therapeutic oral dosage).
3. Those cases of acute alveolar abscess with typical clinical symptoms treated principally with penicillin (intramuscular injection).
4. Those cases of acute alveolar abscess with typical clinical symptoms treated with aureomycin (oral administration).

All patients were examined at 24 hour intervals until discharged. Some of the patients were hospitalized and others were not. Since a number of factors other than the severity of the infection determined whether a child patient was admitted to the hospital, this information was not recorded. These factors were: age of the child, cooperation of the child, location of the infection, method of treatment, general health of the child and home conditions of the child.

The temperature recordings are rectal temperatures of which 99.6° F. is considered normal.

All of the cases treated by aureomycin therapy have been treated since September 1949. Only the patients who evidenced typical symptoms of an acute al-

veolar abscess were included in this study. Several patients treated with aureomycin during the past year had been treated with other antibiotics or by hot applications prior to aureomycin therapy. Since these cases were few in number they were not recorded in this study.

The aureomycin[5] was used in two forms: 50 mg. capsules which were used for the older patients who were able to swallow them, and Spersoid (a chocolate powder containing 50 mg. per 3 Gm., or rounded teaspoonful) which was used for the younger patients.

The patients ranged in age from 3 to 13 years.

RESULTS

The 16 instances of acute alveolar abscess treated by hot applications along with symptomatic treatment with anodynes, fluids and sedative are summarized in the table. Treatment was mainly the intermittent use of hot mouth washes. However, some external heat was applied in certain cases. This was continued until drainage occurred or the infections resolved. Five cases were treated without the apparent necessity for any drugs for the relief of pain. The average peak temperature reached during the course of the treatment of these cases was 101.3° F. rectally. The highest temperature recorded was 103.6° F. and the lowest 99.6° F. It was noted on several of these records that the temperature was higher on the second or third day of treatment. The acute symptoms of pain, temperature and active inflammation subsided in these cases after an average of 2.6 days. The longest time for this was six days and the shortest, one day. The total recovery period averaged 6.9 days, the longest being 20 days and the shortest four days. Ten out of the 16 infections required drainage, or ruptured spontaneously.

Twenty-seven cases treated with systemic administration of sulfonamides were reviewed. The drugs used were sulfanilamide, sulfathiazole or sulfadiazine. All were prescribed in therapeutic oral dosages (0.15 to 0.20 Gm. per kilogram of body weight daily, divided into four or six equal doses) over a period necessary for the recovery of the infection, varying with the different cases. These are presented in the table. The average temperature peak in these cases was 101.1° F., the highest temperature recorded being 103.8° F., the lowest 99.6° F., and none rising on the second or third day. The acute symptoms subsided in an average of 2.8 days, the longest period being seven days and the shortest one day. The total recovery period averaged 6.7 days, the highest being 20 days and the lowest two days.

5. Aureomycin supplied by the Lederle Laboratories Division of the American Cyanamid Company.

Table • Summary showing effectiveness of treatment for acute alveolar abscess

Therapy	No. of cases	Supplemental treatment	Peak temp. F.	Days acute symptoms subsided	Days total symptoms subsided	Percentage where drainage occurred
Heat	16		101.3	2.6	6.9	62
Sulfonamides	27	Heat (17) Penicillin (1)	101.1	2.8	6.7	51
Penicillin	22	Heat (3) Sulfonamides (1)	100.5	2.0	5.9	31
Aureomycin	28		100.1	1.5	4.0	0

Out of this group of 27 cases, 14 required drainage or drained spontaneously; an average of 51 per cent. In 17 cases heat was combined with the sulfonamide therapy. Most of these 27 cases also were treated symptomatically with anodynes and sedatives.

Twenty-two cases were reviewed where penicillin was used for the treatment. These are also shown in the table. Intramuscular injection of from 100,000 to 400,000 units daily was the method of administration. The average temperature peak was 100.5° F., and there was no rise in temperature after treatment began. The average number of days necessary for the acute symptoms to subside in this group was two days, the longest period being five days and the shortest period one day. The average number of days for the case to recover was 5.9 days, the longest period being 10 days and the shortest being three days. Seven of the 22 cases, or 31 per cent, required drainage or drained spontaneously. Three of these cases were treated also with heat therapy.

Twenty-eight cases were treated with aureomycin alone. The average peak temperature in these cases was 100.1° F., the highest being 101.6° F. and the lowest 99.6° F. The average number of days necessary for the acute symptoms to subside was 1.53, the longest period being two days and the shortest one day. The average number of days necessary for complete recovery from the infection was 4.03, the longest being seven days and the shortest two days. In this series of infections none were incised for drainage, none were opened through the tooth, and none drained spontaneously.

DISCUSSION

Hot applications have been a long standing method for the treatment of acute alveolar abscess. It has been pointed out by Podolin[6] that the purpose of heat is to step up the inflammatory process, thereby localizing the infection so that the products of the inflammatory process may be more rapidly evacuated naturally through the blood stream, or more often artificially by incision or rupture. This has been combined with accompanying cold applications in order to concentrate the localizing process in more desirable locations; that is, within the mouth rather than on the outside of the face.

Frequently this treatment was continuous for several days before localization occurred and during this time the acute symptoms even may have increased as illustrated by the instances in which the peak temperature rise was not reached until the second or third day. This would be expected in view of the objectives of the treatment. During this period the patient was kept as comfortable as possible with aspirin, barbiturates and narcotics.

In the management of the child patient with an acute infection this treatment was very difficult and in many cases, because of the lack of cooperation of the child, was almost impossible. The child was in severe pain, temperature rises could be expected, and there was always the fear of complications developing. Constant nursing attention was necessary, especially in the younger age group.

The establishment of drainage also was difficult for the patient unless a general anesthetic was used. Frequently these infections were drained by means of an incision into an area refrigerated with ethyl chloride. This was not pleasant either. Removal of the tooth often was the quickest way to achieve drainage and the proper time for this depended upon the manipulation necessary, the location and the means of anesthesia. The untoward consequences of this, if not properly handled, were often serious.

When sulfonamides first came into use the management of the acute alveolar

6. Podolin, Matthew. Cold and heat therapy in dental inflammations. J.A.D.A. 23:61 (Jan.) 1936.

abscess was greatly facilitated. The advantages provided were in the form of protection against the further spread of the infection and more rapid resolving of the infection. This is evidenced in this study by the reduction of the peak temperature average and the necessity for drainage as compared to those infections treated by hot applications. As stated by Mallett,[7] "resolution of an alveolar abscess was found to be more likely with sulfonamide therapy than without it." However, in this series of cases, the time for the infection to be resolved did not seem to be altered.

When penicillin was introduced, with its greater effectiveness and wider range of safety, the management of acute alveolar abscess in children became even more satisfactory. In this group of patients, the use of penicillin provided a further decrease in temperature elevation during the course of the infection, more consistently reduced the recovery period, and further reduced the necessity for drainage by 31 per cent over the infections treated by hot applications and by 20 per cent over those treated with sulfonamides. The total number of days required for full recovery was reduced, but more important, the patients responded in a consistent manner. No infections extended over a period greater than 10 days and the acute symptoms more consistently subsided within a two to three day period. This seems to substantiate the statement made by Mallett[7] that "the accumulating data indicate that countless acute alveolar abscesses, which before the use of sulfonamides and penicillin would have developed into osteomyelitis or would have required extraoral incisions for drainage, are being resolved without either complication through the use of antibiotics." The fact that in the cases studied which were treated by sulfonamide therapy or penicillin therapy the infection did not progress but responded more consistently would account for the complications not developing inasmuch as the original infection did not get a chance to spread any further.

The over-all picture was one that would be expected. Prior to chemotherapy, the infections responded in various ways, some becoming worse before localizing, others resolving within a short time. However, after the sulfonamides were employed in the treatment, the infection responded more consistently and seldom spread further. When penicillin was introduced in the picture, the results became even more consistent, with a more rapid response as well. In short, the more efficient the chemotherapeutic agent, the more rapid the response of the infection. When aureomycin was introduced, with its even greater efficiency, the results could almost be anticipated.

Aureomycin, being one of the most recently developed antibiotics, presented several advantages that make its use by the dental profession exceptionally valuable. First, it has a very wide range of activity as discussed earlier. Second, it has a very low toxicity. Third, few side reactions occur and those that do are mild. Fourth, its method of administration is safe and easy for both children and adults.

In this series of cases studied, the peak temperatures were again reduced, acute symptoms subsided more quickly and the patients were completely recovered within a very short period of time. The startling thing in this series was that drainage was not required and did not occur spontaneously in any of the cases treated. This may be attributed to three things: (1) the patients were all treated as soon as they appeared at the dental clinic with the typical symptoms of an acute alveolar abscess as pictured in Figure 2, left, and therefore the infection was resolved before an accumulation of purulent products could occur; (2) because of the versatility of the antibiotic,

7. Mallett, S. P. Use of chemotherapy in dental infections. J.A.D.A. 37:539 (Nov.) 1948.

the bacteria involved were combated as soon as an effective blood level of aureomycin was established; (3) at no time were hot applications allowed during the treatment. The consistent response to the treatment within 24 to 48 hours as illustrated in Figure 2, right, stands as good evidence why no localization occurred. This same clinical result developed in all of the 27 cases treated—rapid resolution of the acute phase as well as of the total clinical symptoms of inflammation. No side reactions occurred in this group during the course of treatment with the exception of one instance in which a mild nausea developed on the third day.

Figures 3 and 4 show the comparative effects of the various methods of treatment on the acute phase of the infection. The introduction of the chemotherapeutic agents caused an immediate effect on the temperature of the patient (Fig. 3). More important, once treatment was begun, the patient's temperature did not rise as had so frequently occurred during the course of treatment with hot applications. This gave a lower average temperature for all cases where chemotherapy was employed, the lowest average temperatures occurring with the most efficient antibiotic.

Little difference was seen in the first two methods of treatment as regards the average number of days required for the acute symptoms to subside, while in the last two, antibiotic therapy alone, a definite improvement was noted (Fig. 4). This indicates that penicillin and aureomycin attack the infection immediately. However, this was more clearly shown in the time necessary for the total symptoms to subside as shown in Figure 5. The difference between the first method of treatment and the last three would indicate that the use of heat prolongs the total course of the infection although it may help to localize it. This illustrates the reason why complications developing from an infected tooth need no longer be a concern to the dentist if early antibiotic therapy is instituted. The infection

Fig. 2 • Left: Patient showing typical symptoms of acute alveolar abscess involving upper first deciduous molar prior to treatment. Right: Same case 48 hours after systemic aureomycin therapy

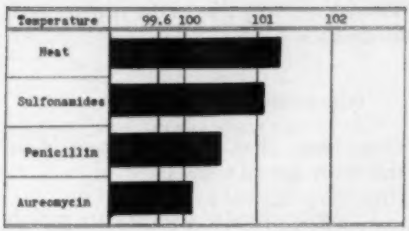


Fig. 3 • Average peak temperatures (F.) reached during course of treatment

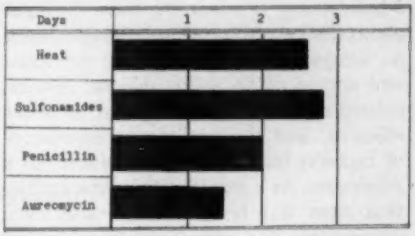


Fig. 4 • Average number of days for acute symptoms to subside

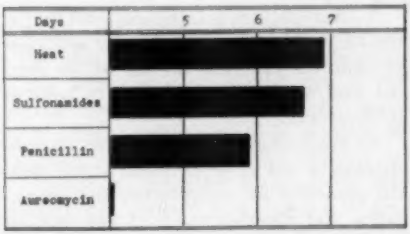


Fig. 5 • Average number of days for total symptoms to subside

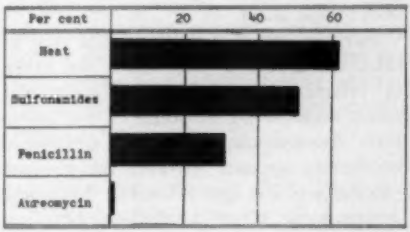


Fig. 6 • Percentage of cases in which drainage occurred

is resolved before it has a chance to spread to any adjacent tissues.

Figure 6 illustrates the most desirable result of antibiotic therapy, that of resolving the infection before an accumulation of pus can occur. It is interesting to note a comment by Mallett[7] to the effect that "chemotherapy alone (sulfonamides) is not sufficient and that the focus of the infection must be removed or an incision made and drainage well established for chemotherapy to be of value." The evidence in this study would suggest otherwise where penicillin and aureomycin are used. It is not implied that if pus is localized in a fluctuant mass as a result of an infected tooth, that incision for drainage is not necessary. However, it is suggested that early adequate chemotherapy will resolve the infection before such an accumulation can occur. Further, it is suggested that hot applications are contraindicated for the treatment of acute alveolar abscesses inasmuch as this tends to promote suppuration and point the abscess for drainage. Records at the Boston City Hospital[7] also give evidence on this point inasmuch as the annual average number of extraoral incisions of alveolar abscesses was 40 and intraoral 100 to 115 prior to chemotherapy. During 1947, when penicillin was used alone, only 11 extraoral incisions for drainage of alveolar abscesses were necessary.

Needless to say, the source of the infection must be removed after the infection is resolved in order to avoid recurrence.

The evidence reported in the literature and the evidence accumulated in this study indicate that the treatment of acute alveolar abscesses has undergone a revolution. Therapeutic dosages of antibiotics

administered systemically have brought about this revolution. Complications need no longer be feared from the extension and spread of an acute alveolar abscess, management of the infection is more efficient, and the unpleasant experience of incision for drainage is reduced to a minimum. As a result of this, hospitalization time has been reduced and even eliminated. The advantages these factors offer to the child patient are of great importance because a plan of treatment can be instituted that is definite and effective, and yet requires little cooperation by the child.

Further, in view of the mixed type of infection involved, the wider the range of effectiveness of the antibiotic, the more rapid is the response of the infection. Aureomycin, a recently developed antibiotic, appears to offer the greatest efficiency of the agents used in this study. Aureomycin offers a distinct practical advantage to the dental profession because of its mode of administration, its low toxicity, and its extreme versatility. This is especially true in the management of children.

CONCLUSIONS

Conclusions that may be drawn from this study are as follows:

1. Acute alveolar abscesses are rapidly resolved by the early use of effective antibiotics.
2. Incision for drainage is seldom necessary when early antibiotic therapy is prescribed.
3. Aureomycin is especially effective in the treatment of acute alveolar abscesses in children, practical for use by the dentist and very safe according to present information.
4. Rationally used, systemic chemotherapy is not to be avoided by the dentist provided he understands the advantages and disadvantages of the various agents he employs, its indications and contraindications and its method of management.

Evidence • The wish that anything may be true, powerfully influences the mind toward finding it true. A researcher in pure science is usually far less influenced by prejudices and wishes than is the investigator who is aware of the practical results of his findings. Even the pure scientist is, however, likely to be prejudiced in favor of a theory that he himself has proposed or espoused. His reputation depends upon its being verified, hence in his selection of facts and interpretation of results, he is unconsciously prejudiced. This tendency to error has, however, a natural corrective. Other scientists may make their reputation by finding defects in old theories and in proving new ones. It has now become a recognized principle that evidence of the truth of a theory presented by one man cannot be accepted as reliable, even as to the facts given in its support, until others have made the same observations and experiments with the same results. This is especially required when the facts reported seem not in harmony with well-established theories. *Edwin A. Kirkpatrick. Journal of the International College of Surgeons 15:175, February 1951.*

COUNCIL ON DENTAL HEALTH

Dental administration in state health departments

For some time the American Dental Association has urged the establishment of dental units in state health departments. The Association has urged further that "the administration of the dental program should be in the hands of a qualified dental officer who is directly responsible to the state health officer."

There is presently a trend in state health department organization to limit the number of subordinates reporting directly to the state health officer, purportedly for purposes of improving the economy and efficiency of the departments. This reorganizational pattern is being actively advanced by representatives of the American Public Health Association, administrative advisers of the U.S. Public Health Service, and consultants from schools of public health. These recommendations have resulted in several instances in lowering the administrative position of the dental unit from one directly under the state health officer to one under an intermediary division or bureau.

After years of encouraging the development of well organized and competently directed dental units in state health departments, the dental profession in the United States is gravely concerned about changes now being made which can affect the function, standards and advancement of such units. Almost without exception, these changes are being made without consulting the dental profession in the states involved.

The following material is intended to define the problem, to provide background information and to set forth steps which seem necessary to correct and prevent inexpedient administrative patterns for dental units in state health departments.

SIZE AND SCOPE OF THE DENTAL PROBLEM

The medical administrator tends to draw attention to the size of the dental health program without giving enough foresight to the size of the dental health problem and the opportunities for its amelioration. Dental diseases are the most prevalent of human disorders as they affect approximately 98 per cent of the population. Their toll is represented in terms of general health, personal appearance, social adjustment, financial burden to individuals, and in school and industrial absenteeism.

It seems to take a war to emphasize the size and scope of the dental health problem—when dental disease affects the physical ability of inductees in the Armed Forces. The country was shocked during two world wars by the number of young men disqualified as a result of

A compilation of background material concerning the principles and policies involved in dental public health administration, designed to aid constituent societies of the Association in their efforts to secure a satisfactory administrative position for dental units in state departments of public health. Prepared in consultation with the Council on Legislation.

dental disease. Additional evidence is accumulating in the present national emergency. On the day that President Truman announced the procedures for Selective Service registration of dentists and physicians, a prominent newspaper reported that only 4 per cent of inductees were free of dental defects. Based on results found at one of the Army reception centers, the dental needs of the incoming 18 year old group were reported as follows: 35.5 per cent needed immediate extractions and care for dental infection, 39.1 per cent needed restorations, 17.4 per cent had dental disease but needed no immediate or emergency treatment, and only 4 per cent were free from dental disease.

It has been well demonstrated that much can be accomplished through sound public health procedures to lessen the dental health problem to a considerable extent. Dentistry is making rapid advancements in the preventive field. The employment of newer preventive technics together with an enlargement of community education and service programs promise to be the most effective agents in the fight against dental disease.

The leadership for these programs must come largely through competently staffed and adequately financed dental units in state health departments. The dental units must be in a position to carry on their programs without undue administrative blocks resulting from inadequate understanding and support of the dental program by administrative superiors.

ADMINISTRATIVE REQUIREMENTS FOR DENTAL UNIT

Dentistry is a basic health service. In state health departments and in large city, county or district health departments, the dental health program should be administered by a qualified dentist, preferably one with public health training.

The administrative position of the dental officer should be such that he can:

1. Integrate the dental health program with other activities of the department wherever feasible and with the activities of other related official and nonofficial agencies.
2. Plan the budget for the dental program with a knowledge of the over-all proposed budget for the department.
3. Present and defend the dental budget and program within the department and before the appropriating body, if necessary.
4. Have direct access to the health director and other department personnel, when necessary.
5. Plan and conduct the dental health program in accordance with established policies of the department.
6. Have an opportunity to participate in all department staff meetings called by the health officer.
7. Expand dental health activities as rapidly as possible and desirable in order to meet adequately a health need which affects 98 per cent of the population and for which there is an increasing number of new methods of control.
8. Maintain the prestige of the dental service and the dental profession.
9. Receive a salary commensurate with other personnel in similar administrative positions within the department.
10. Have freedom from unconscious or intentional discrimination of an administrator trained and interested in fields other than dentistry.

POLICY OF THE AMERICAN DENTAL ASSOCIATION

The policy of the American Dental Association is expressed in the following resolution, which was adopted by the House of Delegates, November 2, 1950:

Whereas, recent surveys and reports by the American Public Health Association, the U.S. Public Health Service and other agencies

have been made to enhance the reorganization of state health departments, and

Whereas, these surveys and reports are intended to limit the number of subordinates reporting directly to the state health directors or state health officers to improve economy, efficiency and administration, and

Whereas, in several states *the administrative control of* public health dentistry has been relegated to physicians or other nondental health officials in these reorganizational plans, and

Whereas, dentistry is a distinct and separate profession supported by its own state and national organizations and no other professions or administrators are qualified to direct, supervise and evaluate dental services including public health dental programs except a dentist, and

Whereas, public health should no longer be considered a public service designed for one profession but should include the many professions providing health services to the people; therefore, be it

Resolved, that the American Dental Association recommend to the American Public Health Association, the U.S. Public Health Service, the Association of State and Territorial Health Officers and allied agencies and commissions that dentistry be made a basic health service in all official state and community health programs, and, be it further

Resolved, that a qualified, full-time public health dentist who will have complete parity with medical or other personnel who are directly responsible to the state health director, be employed to direct and administer state public health dental programs, and, be it further

Resolved, that all state dental societies be requested to take official action to see that these recommendations and resolutions are fulfilled as rapidly as possible through whatever ethical channels are necessary, including legislation to prevent *administrative control of* public health dentistry from being relegated to other professions in health departments throughout the United States, and, be it further

Resolved, that the appropriate officials of the American Dental Association be instructed to assist constituent dental societies in every way practicable to see that these recommendations and resolutions are fulfilled as rapidly as possible.

After adoption of the foregoing resolution, the American Dental Association requested a large number of persons throughout the country who are well acquainted with the problems involved to express their views on the subject. Selected excerpts from some of the replies together with interjected comments by representatives of the Association have been compiled for the information and use of constituent societies. The replies, both favorable and unfavorable to the resolution, may be obtained on request from the Council on Dental Health.

SUGGESTED ORIENTATION OF DENTAL UNITS

The Association recognizes that problems vary in the different states and that it is difficult to fix a pattern of administrative relationships in a field of service which is growing as rapidly as is public health. The Association does not presume to recommend an over-all administrative pattern for any health department. However, from long study and experience the Association has arrived at definite conclusions regarding the relative position which the dental unit should maintain in the administrative structure. The Association believes that in order to fulfill the administrative requirements recommended by the Council on Dental Health, the dental unit must be responsible to the state health officer directly, not through an intermediate official. The dental unit may have subdivisions devoted to various phases of the dental health program as the unit's activities expand.

As examples of administrative patterns which agree with the policy of the American Dental Association, the organizational charts of the state health departments of Texas and California are presented (Fig. 1, 2, 3). The first Texas chart shows the position of the dental unit in a department which has several divisions and bureaus reportable to the state health officer (Fig. 1), and the second Texas chart shows the organizational structure within the dental division itself (Fig. 2). The California chart shows the orientation of the dental divi-

BASIC ORGANIZATION CHART
OF THE
TEXAS STATE DEPARTMENT OF HEALTH

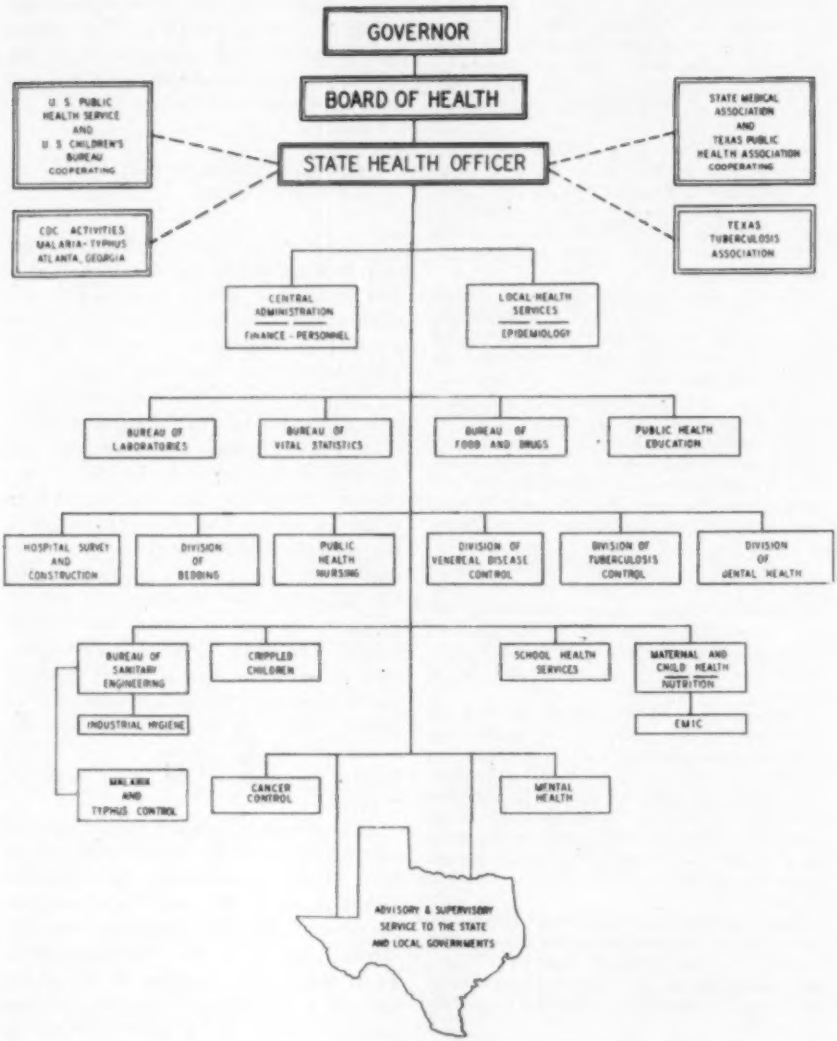
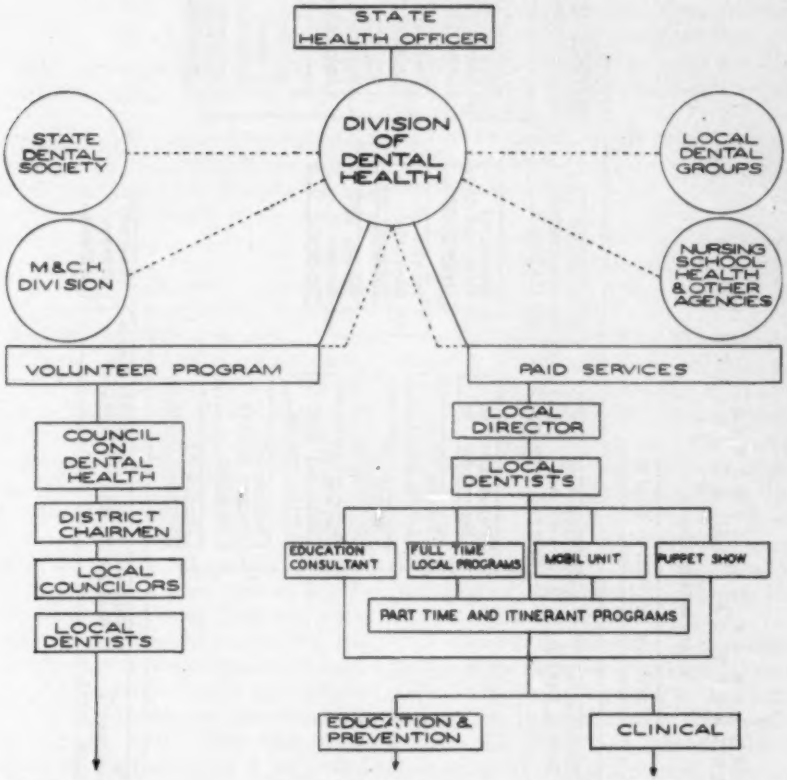


Figure 1

ORGANIZATION CHART

DENTAL DIVISION

TEXAS STATE DEPARTMENT OF HEALTH



VOLUNTEER PROGRAM

1. School inspections with follow-up urge to go to family dentist by teachers and nurses.
2. Lectures; radio; newspaper; exhibits.
3. Assist in distribution of educational materials.
4. Sponsor dental programs in all health programs.
5. Part-time clinics for indigent children in a few places.
6. Assist in state-wide surveys.
7. Assist in Interprofessional Commission program on child growth and development.
8. General assistance in any project involving dental health.

EDUCATION AND PREVENTION

1. Cooperation with schools and colleges.
2. Child development demonstration program.
3. In service training of teachers.
4. Training public health nurses.
5. Sponsoring and training dentists in dentistry for children.
6. Cooperation with other agencies concerned with dental health.
7. Lectures, radio, newspapers, motion pictures, exhibits for general public.
8. Promote public health programs at state convention.
9. Distribute educational materials where needed and desired.
10. Keep educational materials up to date.
11. Dental health puppet show schedule.

CLINICAL

1. School and preschool inspections.
2. Free clinical service for indigent school and preschool children in county and city units.
3. Free clinical service for indigent school and preschool children. Itinerant to county units without full time dentists.
4. Some clinical service to indigent pregnant mothers in unit counties.
5. Itinerant demonstration service including clinical service for school and preschool children.

Figure 2

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

Organization Chart

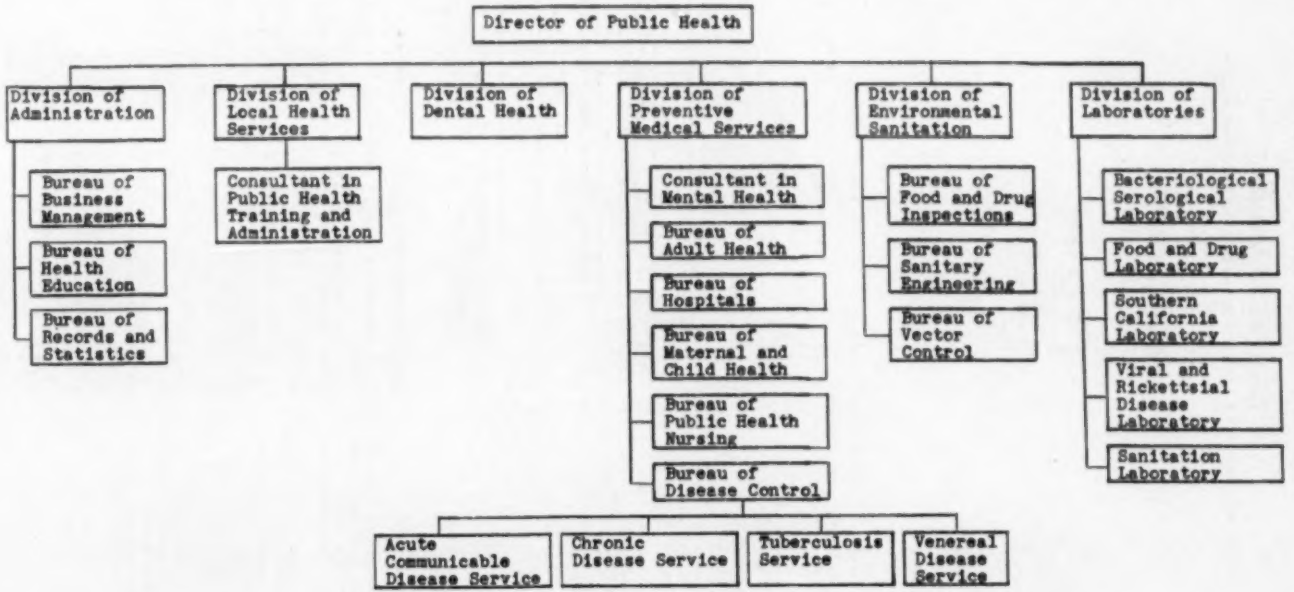

Director of Public Health
Division of Administration
Bureau of Business Management
Bureau of Health Education
Bureau of Records and Statistics
Division of Local Health Services
Consultant in Public Health Training and Administration
Division of Dental Health
Division of Preventive Medical Services
Consultant in Mental Health
Bureau of Adult Health
Bureau of Hospitals
Bureau of Maternal and Child Health
Bureau of Public Health Nursing
Bureau of Disease Control
Acute Communicable Disease Service
Chronic Disease Service
Tuberculosis Service
Venereal Disease Service
Division of Environmental Sanitation
Bureau of Food and Drug Inspections
Bureau of Sanitary Engineering
Bureau of Vector Control
Division of Laboratories
Bacteriological Serological Laboratory
Food and Drug Laboratory
Southern California Laboratory
Viral and Rickettsial Disease Laboratory
Sanitation Laboratory

Figure 3

sion in a large state health department with a limited number of divisions reportable to the state health officer (Fig. 3).

PROS AND CONS ON ADMINISTRATIVE STATUS

Pros • Those who believe that the dental units should be on a subordinate administrative plane and not directly responsible to the state health officer premise that:

1. A state health officer cannot oversee effectively more than five or possibly six individuals at the same time.
2. Even though the state dental health director is immediately responsible to an intermediary deputy, he should have free access to the state health officer on matters of department policy in the dental field.
3. After a physician has gone through a period of training in a school of public health, he emerges as something more than a physician; he emerges as a public health administrator. This new competency changes his old background and philosophy, gives him a new understanding of dental public health, and relieves him from unconscious or intentional discrimination in fields other than those in which he has spent most of his professional life.
4. Dentistry is a medical specialty dealing with "one segment, one anatomical part of the human being." There is no more reason for dentistry to have divisional status than there is for orthopedics, brain surgery, psychiatry, conservation of sight and hearing and other medical specialties to have such status.
5. The resolution of the American Dental Association concerns a national administrative pattern. It does not make provision for the community to determine the best administrative pattern for its local program. It also gives the impression of having arisen more from reaction against an undesirable situation than from a positive approach.
6. Years of observation and participation in public health programs where the horizontal form of organization is in effect have demonstrated that the pattern proposed by the Association is unsatisfactory.
7. The dental health program is too small to warrant a top level administrative position.

Cons • Those who believe that the dental unit should be directly responsible to the state health officer present the following arguments:

1. Apparently the recommendation that an administrator, to be efficient, should limit his relationships to 5 or 6 people was arrived at mathematically and on the assumption that the human mind cannot grasp more than six digits. From this reasoning the conclusion was reached that an administrator should not have more than six subordinates directly responsible to him. There are those in the field of administration who do not accept this reasoning.

A trained mathematician can easily grasp more than six digits, add them, subtract them and see them in their multiples. One unfamiliar with figures cannot do this. Therefore, the addition of one or two additional figures does not tax the mathematician even though it might completely bewilder the nonmathematical mind. As a matter of fact, a few additional digits may make the figure more usable and more real to the mathematician.

To put it in human terms, the addition of one or more assistants may round out a program in such a way that the task of coordination and direction by the administrator is less rather than more complex. The dissenters very realistically point out that any set of human relationships is not entirely subject to the mathematical laws of permutations and combinations. They are, rather, the sum of

the philosophy, background, training and experience of the individuals involved in the relationship.

2. If the state dental director is to have direct access to the health officer, in spite of the administrative pattern, there is little reason for the assumption that it is poor administration for an administrator to coordinate more than a definite number of divisions.

3. The "something more than a physician" which emerges from a school of public health is still a physician. Friction is bound to be generated by unconscious or intentional bias of an administrator trained and interested in fields other than dentistry. The dental director also is a trained administrator, but he is primarily interested in dentistry.

4. Dentistry concerns itself with the patient as a whole and not with one anatomic segment. Dentistry is a specialized health service but not in the sense of a specialty of medicine. In order to be a medical specialist one would first be required to be a physician and then a specialist within that field. As long as separate schools, qualifications and licensing boards exist for the dental profession, dentistry cannot be considered a specialty of medicine. The practicing dentist operates as a distinct professional person responsible not to a physician but to his patients. If dentistry or any other specialty of the health services is to be effective, it must be granted authority commensurate with its responsibility. In terms of health specialization and professional autonomy then, dentistry is not in the same category as the specialties of medicine with which some public health administrators tend to classify it.

5. The Association does not presume to recommend an over-all administrative pattern for any health department. However, from long study and experience the Association has arrived at definite conclusions regarding the relative position which the dental units should maintain in the administrative structure. The action of the Association might have the appearance of arising from reaction against an undesirable situation, and for a very good reason. Almost without exception, the dental profession never has been consulted by state public health authorities when changes were being considered.

6. Many state health directors could state as authoritatively that after "a number of years of observation and participation in public health programs" they are convinced that even under the most sympathetic administration, friction is bound to be generated when one professional group makes decisions which affect the function, standards and advancement of another profession.

7. It is unsound administrative planning to delegate administrative authority for a program according to the amount of money being spent on it at a particular time. The unit in charge of the program should be in a position to develop and eventually approach an activity commensurate with the size of the problem involved.

8. It is generally agreed that the dental health program must be integrated with all other activities of the department, yet it is impossible for the dental director to coordinate his program effectively with the programs of other directors when he has no opportunity to participate in regular staff conferences. Subdivisional status rarely provides an opportunity for participation in planning for the department's over-all health program.

9. It is important to the success of the dental program that the prestige of the dental profession and of dental services be maintained in the state. Only a dentist in an authoritative administrative position can work effectively with the professional dental group in his state. He cannot work on this desirable plane if his hands are tied by an administrator trained and interested primarily in fields other than dentistry.

10. Even though, as in some instances, the intermediary deputy is sympathetic to dentistry, the administrative pattern cannot be justified on this basis. Administration should be based on function and not on personalities.

11. All agree that the ideal administrator would be entirely free of unconscious or intentional bias based on his previous training and experience, but since such an administrator is rare it becomes necessary, in establishing an administrative pattern, to take into consideration the frailties of human nature to which the average administrator is not immune.

12. Speaking purely from an administrative standpoint, the dentist in the health department organization theoretically should be able to attain the same administrative level as other persons in the department. This administrative provision should be attainable in terms of both salary and administrative authority. However, there are two primary blocks which prevent this situation from ever becoming a reality. First, most state laws will not permit a dentist to become a local or state health officer. Second, persons who assume one of the top level positions are always physicians, engineers or lay administrators.

13. In busy state health departments, many of the personnel are frequently in the field, and the dental director finds it very time consuming to wait for an immediate superior to return to the office and then wait further for a second clearance from the state health officer for needed directives or consultation. The intermediate person adds to unnecessary delays and red tape.

14. All students, including dentists, in most schools of public health are taught far more about such subjects as sanitary engineering, public health education, public health statistics, communicable disease control and nutrition, than they are about dental health, which is relegated to a few hours of instruction at best. The physician receives little or no training in, and has very little understanding of, problems in the dental health field.

15. Dentists are the third largest professional group in the country, being outnumbered only by physicians and lawyers. Except for physicians, dentists represent the largest profession in the health field. Any public health program dependent on the services of a recognized profession should have that profession in a dominant position in the administrative structure.

16. In most states, department budgets are presented to legislative bodies in terms of the major divisions of the particular department. When the dental unit is in subdivisional status, the budget for the dental program loses its identity, and the interest of many citizens in dental health cannot be expressed adequately by their representatives in the legislative assembly. Also within the health department itself, an intermediary deputy cannot justify and defend a dental budget adequately before the department budgetary authorities. During the fiscal year 1950 only 0.4 per cent of health grants to the states from the U.S. Public Health Service were allocated for dental health programs. Subdivisional dental directors are not in a position to justify effectively a request for funds commensurate with the size and scope of the dental problem. (See Suggested Reading, 8.)

17. Dentistry's major concern is not in the prestige of a high echelon position in a state department but in an administrative position for the dental unit which will allow it to function most effectively within the over-all framework of the health department and with due regard for the size and scope of the dental health problem within the state.

18. Dentistry is relatively new in the public health field and at times the enormity of its problems are almost staggering. Also, the methods of dealing with these problems are not yet as clearly

defined and uncontroversial as in many other public health fields in which the methods of operation have become more stable and accepted. The facts demonstrate that the dental director should be directly responsible to the state health officer and that he should have convenient and direct access to other divisions of the department, so that his presentations will not be weakened by an intermediary who is not fully acquainted with the dental problem.

ADMINISTRATIVE STATUS OF DENTAL UNITS

In 1933, the Association, in cooperation with the U.S. Public Health Service, conducted a survey of dental activities in state health departments. At that time there were 12 state health departments with identifiable dental public health units. Of these, seven were directed by dentists. At the present time, 46 states, the District of Columbia and three territories have organized dental public health units. Of the 46 state units, 40 are under the direction of a dentist, 1 under a dental hygienist and 1 under an educator.

The present administrative position of dental units in the various state health departments is shown in the accompanying table. Dental units are directly responsible to the state health officer in 21 states and are responsible to an intermediate division or bureau in 25 states. Dental units in five of the 25 states are in the third level of administration. Six states have no organized dental health program directed by a dentist or dental hygienist.

The salary ranges of dental personnel in state health departments were published in the *Bulletin of the American Association of Public Health Dentists.*[1] In 17 states, dentists receive the same salary as physicians in comparable administrative positions, although dentists may not be able to advance to as high an echelon as can physicians and thereby attain higher salaries. In 11 states, dentists receive lower salaries than physicians in similar administrative positions. Seventeen states submitted no information on salaries.

RELATION OF DENTAL ACTIVITIES TO OTHER DEPARTMENT FUNCTIONS

The dental health program is intimately associated with many other programs of the health department. The dental unit needs administrative freedom in order to integrate properly the dental program with the programs of other major units. Instances of the dental unit's relation to other health department units and their activities follow:

1. General administration — budgets and legislation.
2. Local health services — development and operation of local dental programs.
3. Maternal and child health — development of a dental program which is largely devoted to children, and apportionment of funds from Federal grants for maternal and child health care.
4. Laboratories—saliva diagnostic service, water analyses, biopsies, and other diagnostic and educational facilities.
5. Public health education—purchase, development and distribution of dental health education materials; planning and conducting all dental health education programs.
6. Cancer control — diagnosis and treatment of oral lesions; use of diagnostic and educational facilities.
7. Public health nursing — development and operation of all local dental programs.
8. Hospital construction and operations—dental facilities for the dentists' use in the hospital.

1. Salary ranges of dental personnel in state health departments (editorial). Bul. Am. A. Pub. Health Den. 10:16 (Nov.) 1950.

9. Industrial hygiene—diagnosis and detection of oral occupational diseases and general dental health.

10. Mental health—consultation and diagnosis in instances which may involve dental deformities.

11. Geriatrics, chronic diseases, heart disease and related programs — where dental health has an important bearing on the care of the aged and chronically ill.

12. Vital statistics—aid in handling dental statistical information.

13. Environmental sanitation and public health engineering—particularly those activities concerned with the addition or extraction of fluorides in the public water supply.

14. Venereal disease control—dental inspections which may reveal oral manifestations of syphilis.

15. Tuberculosis control—dental care for the tuberculous patient which is a main factor in recovery.

The accomplishments of the dental unit are not always reflected in the health department program. School authorities contribute heavily in time and money to make the program effective. School nurses, principals, superintendents, health coordinators and individual teachers contribute many hours of time to this over-all program. In other words, the amount of money spent directly on a project is not always an indication of the size of the program or the interest manifested.

The dental unit does not always get the credit for the activities of the dental profession in public health. Each year thousands of school inspections are made and remedial services rendered gratuitously by members of the dental profession. These activities, stimulated largely by the dental unit, should be added to the direct accomplishments of the unit if a fair evaluation of the over-all program is to be made.

Because of limited budgets and personnel, the dental unit should not be relegated to a minor position where it will be even more difficult to realize its ultimate objectives.

LEGISLATIVE CONSIDERATIONS

Before attempting by law to fix the administrative rank of a state health department dental unit directly under the department head, a state society should consider certain aspects of the existing law or laws governing the department, as well as the administrative pattern established under the statutory authority. At the same time the state society should consider the steps that should be taken to inform the legislature of the need for placing the dental unit on the first level of administration below the health officer.

The laws creating state departments of health generally are of three types. (1) The first type specifies what major units (major units meaning those directly responsible to the department head) are to be included. This type may be divided further into two categories. One (1*a*) creates a comparatively large number of health units, and the other (1*b*) creates a limited number. (2) The second type, while not creating specific health units, authorizes the department head to create specified units. (3) The third type authorizes the department head to organize the functions of his department according to a scheme which will best satisfy the needs of the state.

Where the law (Type 1*a*) establishes a considerable number of major units, the addition of the dental unit to that list should not be too difficult to accomplish. This type of law establishes what might be termed a horizontal administrative pattern, by placing a number of units directly under the department head. The addition of another major unit should not complicate the over-all administrative scheme. But where the law (Type 1*b*) establishes a limited number of major units, an attempt to add another major unit may not be too easily accomplished.

Table • Administrative status of dental units in state health departments

State	Title of unit	Dental director now employed	Directly under department or board head, and if by legislative action or administrative fiat	Same salary range as physicians in comparable administrative positions
Alabama	Division of dental health	Yes	No	No
Arizona	Dental section[1]	No	No Administrative fiat applies—organization incomplete[2]	No information
Arkansas	Dental section[1]	No	No	No information
California	Division of dental health	Yes	Yes Legislative action[3]	Yes
Colorado	Section of public health	Yes	No Administrative fiat applies[2]	No
Connecticut	Dental section[1]	Yes	No	No information
Delaware	Division of oral hygiene	Yes	Yes Administrative fiat applies[2]	Yes[4]
Florida	Bureau of dental health	Yes	Yes Administrative fiat applies[2]	No information
Georgia	Division of dental health	Yes	Yes Administrative fiat applies[2]	No information
daho	Dental section[1]	Yes	No	No information
Illinois	Bureau of dental health	Yes	No	Yes
Indiana	Division of dental health	Yes	No Administrative fiat applies[2]	Yes
Iowa	Division of dental hygiene	No	No	No information
Kansas	Division of dental hygiene	Yes	Yes Administrative fiat applies[2]	Yes
Kentucky	Dental division	Yes	No Administrative fiat applies[2]	Yes
Louisiana	Section of dental health[5]	Yes	No	No information
Maine	Division of dental health	Yes	Yes Administrative fiat applies[2]	Yes
Maryland	Division of oral hygiene	Yes	Yes[7] Administrative fiat applies[2]	No
Massachusetts	Division of dental health	Yes	No Administrative fiat applies[2]	No information
Michigan	Section of public health dentistry	Yes	No	Yes
Minnesota	Division of dental health	Yes	No Administrative fiat applies[2]	No information
Mississippi	Mouth health unit	Yes[4]	No[4]	Yes
Missouri	Bureau of dental health	Yes	Yes[7] (see Act of January 6, 1950)	Yes
Montana	Division of dental hygiene	Yes	Yes Legislative action[3]	No
Nebraska	Division of dental health	Yes	Yes Legislative action[3]	Yes
Nevada	Division of dental health	Yes	Yes Administrative fiat applies[2]	No
New Hampshire	Division of dental services	Yes	No Administrative fiat applies[2]	Yes

Table • Administrative status of dental units in state health departments

State	Title of unit	Dental director now employed	Directly under department or board head, and if by legislative action or administrative fiat	Same salary range as physicians in comparable administrative positions
New Jersey	Section of dental diseases	Yes	No Administrative fiat applies[2]	No
New Mexico	No dental unit			
New York	Bureau of dental health	Yes	No Administrative fiat applies[2]	No
North Carolina	Division of oral hygiene	Yes	Yes Administrative fiat applies[2]	Yes
North Dakota	Division of oral hygiene	Yes	No Legislation[6]	No information
Ohio	Division of dental hygiene	Yes	No	No information
Oklahoma	Division of preventive dentistry	Yes	Yes Legislation[8] Administrative fiat applies[2]	Yes
Oregon	Section of dental health	No	No Administrative fiat applies[2]	Yes
Pennsylvania	Bureau of dental health	Yes	Yes Administrative fiat applies[2]	No
Rhode Island	Dental services section[1]	Yes	No	No information
South Carolina	Division of dental health	Yes	Yes Administrative fiat applies[2]	No information
South Dakota	Division of dental health	Yes	Yes Administrative fiat applies[2] and legislation[8]	No information
Tennessee	Dental health service	Yes	No Administrative fiat applies[2]	No
Texas	Division of dental health	Yes	Yes Administrative fiat applies[2]	No
Utah	Division of dental health	Yes	Yes Administrative fiat applies[2]	Yes
Vermont	No dental unit			
Virginia	Division of dental health	Yes	No	No
Washington	Dental health section[6]	Yes	No	No
West Virginia	Bureau of dental health	Yes	Yes Administrative fiat applies[2]	Yes
Wisconsin	Dental education	Yes	Yes Administrative fiat applies[2]	Yes
Wyoming	Division of dental health	Yes	Yes Legislative action[3]	Yes
District of Columbia	Bureau of dental services	Yes	Yes Administrative fiat applies[2]	No information
Alaska	Unit of public health dentistry[1]	No	Yes	No uniformity
Hawaii	Division of dental health	No	Yes Legislative action[3]	Yes
Puerto Rico	Bureau of oral hygiene	No	No	No information
Virgin Is.	No information			

1. Under maternal and child health unit.
2. Law empowers department or board head to establish separate sections in any of the health fields.
3. Position of dental unit is fixed by law.
4. Now directed by a dental hygienist but plans are to employ a dentist director as soon as practicable. Dentist is to have comparable salary range as physicians.
5. Under preventive medicine unit.
6. In department of health and welfare.
7. Reorganization expected in 1951.
8. Law authorizes the department or board head to establish a dental unit under his direct control.

The administrative pattern reflected in the Type 1*b* law might be termed vertical, the intent of which is to concentrate within a few units the responsibility of reporting directly to the department head. This type of administrative pattern is complicated further by the wide scope of services which logically can fall within each of the major units. For instance, the present Missouri law creates a Department of Public Health and Welfare. It specifies that the three major divisions of the department shall consist of the Division of Health, the Division of Mental Diseases and the Division of Welfare.

The problems presented in amending the second type of law, namely, one which authorizes the creation of specified units, are substantially the same as those presented in amending the first type. The practical problem involved under such a law, however, is whether the department head can be persuaded to create a major dental unit. North Dakota furnishes a good example of this type of law. The law authorizes nine major units, including a Division of Oral Health, and authorizes the creation of such additional divisions as are deemed necessary. However, a Division of Oral Health has not yet been established.

The third type of law, that which authorizes the department head to organize his department as he sees fit, presents a serious problem in amending. To include within such a law specific direction or authorization to create a major dental unit might be condemned as a violation of the policy of the law, as this type of law is designed to permit the health officer to use his own discretion in organizing and reorganizing his department in any reasonable manner. Under this type of law the dental society should make every effort to persuade the department head that the dental health of the state is a major concern of the department and worthy of major status before it attempts to have the law amended.

The most serious obstacle to the creation of a major dental unit is the trend toward establishing vertical administrative patterns. The argument is raised that the addition of a major dental unit will violate the pattern and interfere with the government and the economy of the entire health program. That argument must be met by clearly showing that in any broad health program, the dental program is sufficiently important to warrant a major unit, even where the number of units is extremely limited.

The justification for a major dental unit leads to a consideration of the steps to be taken to inform the legislature of the need for establishing such a unit. In addition to direct appeal to the members of the legislature, an informational and educational program should be directed to the public at large and to other organized groups interested both in good government and in getting the maximum benefits from a well rounded health program. In line with the educational program, the state dental societies should solicit the assistance of the public and reputable groups to inform the members of the legislature of their stand and their reasons for that stand.

A SATISFACTORY ADMINISTRATIVE POSITION

The problems in securing a satisfactory administrative position for the dental unit will vary considerably from one state to another, and the proper methods of approach can be determined best after a thorough study of the problem has been made by the dental society members. The following steps are suggested as a general procedure to be followed by constituent dental societies in their respective states:

1. Delegate a committee to discuss the matter with the state dental director, the state health officer and state board of health or similar body.
2. Find out what the law requires or allows in your state.

3. Seek out the important people and organizations which may be concerned with the problem. State dentistry's case and solicit their understanding and support.

4. If necessary and desirable, introduce and vigorously support legislation to the governing body of the state, which would specifically direct the establishment of a dental unit immediately responsible to the state health officer. If possible, the legislation should carry provision for specific state appropriations for the dental program.

W. Philip Phair, D.D.S.
Assistant Secretary

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COUNCIL OF THE NATIONAL BOARD OF DENTAL EXAMINERS

Five hundred and fifty-five applicants take National Board dental examinations in April

The Council of the National Board of Dental Examiners has just completed the testing of the largest group of students and dentists that has ever been tested at one time. On April 9 and 10, 1951, tests were given in 19 testing centers to a total of 555 individuals. This is about double the size of any group previously tested. The number of dentists and students that have appeared for examination since 1946 is as follows:

1947: January, 132; April, 141; December, 102.
1948: April, 110; December, 61.
1949: April, 133; December, 200.
1950: April, 287; December, 162.
1951: April, 555.

The certificates of the Council of the National Board of Dental Examiners are now accepted in 26 states and by the U.S. Public Health Service and the U.S. Army. All states accepting the certificate

require the applicant for licensure to take the practical examination. The following is a list of the examining boards and agencies that recognize the National Board certificates:

Alabama	Missouri
Arizona	Nebraska
Connecticut	Nevada
Illinois	New Hampshire
Indiana	New Mexico
Iowa	Oklahoma
Kansas	Oregon
Kentucky	Pennsylvania
Louisiana	Rhode Island
Maine	South Dakota
Maryland	Vermont
Massachusetts	Virginia
Michigan	U.S. Public Health
Minnesota	U.S. Army

Certificates of the Council of the National Board of Dental Examiners are issued immediately after the successful completion of both parts of the examination, each of which is a two day examination. After three years, holders of the certificate are required to return the certificate to the Council with affidavits to show that they have been in practice and possess high ethical and professional standards. Having reviewed these affidavits, the Council will then issue a registered certificate. Certificates that are not registered at the end of the three year period will be voided and therefore cannot be used except during the three year interval directly following the completion of the examination.

The National Board examinations given in April for the first time included four examinations that departed from the essay type. These examinations were in the fields of anatomy, bacteriology, physiology and prosthetic dentistry. The essay type examinations that are used commonly include 10 questions requiring the person to write at some length giving certain required facts and explaining certain principles. The new type tests include about a hundred questions and thereby cover a greater proportion of the entire field. Each of these questions can be answered by either selecting one of several answers that have been provided on the test paper, or by filling in a blank with a single word or phrase. Both the essay type question and the nonessay type question will continue to be used in those particular parts of the examinations in which they prove to be most effective and useful.

The Council of the National Board of Dental Examiners has developed examinations in the following subjects: Part I—anatomy; bacteriology; physiology; general pathology; histology and embryology; biochemistry and dental materials. Part II—operative dentistry; materia medica and therapeutics; prosthetic dentistry; oral surgery and anesthesia; orthodontics, jurisprudence and ethics; oral pathology and roentgenology.

Part I of the examination requires two days and may be taken by any dentist or by a dental student who has completed nearly two years of his dental school course. Part II of the examination also requires two days and may be taken by any dentist who has successfully passed Part I of the examination or by a dental student who not only has passed Part I but who has nearly completed his senior year in dental school. To pass either part of the examination, a candidate must secure an average grade of 75 per cent or more for the entire part with no grade below 70 per cent in any of the six areas.

Testing centers are established at the various dental schools and may also be established at any center at which five or more candidates can be assigned. Arrangements can also be made to give the examinations abroad.

Application forms may be secured by writing to the secretary of the Council at the Central Office of the American Dental Association.

Shailer Peterson
Secretary

COUNCIL ON DENTAL THERAPEUTICS

Council announces classification of additional products

The classification of products by the Council on Dental Therapeutics of the American Dental Association has been described in a previous report (*J.A.D.A.* 40:489, April, 1950). The Council's program now provides for classification of products in Group A, Group B, Group C and Group D. Products are reconsidered periodically and decisions are subject to change at any time that a substantial amount of new evidence becomes available. The files of the Council contain information on many drugs and dental cosmetics, and inquiries are welcome.

GROUP A

Listing of products in Group A means that at the time of their consideration the items conformed with the provisions of acceptance established by the Council on Dental Therapeutics and adopted by the Board of Trustees and the House of Delegates of the American Dental Association. Items in this group will be listed in *Accepted Dental Remedies,* and may use the Seal of Acceptance, unless otherwise provided.

The following additional products are classified in Group A:

Procaine HCl 2%, Tetracaine HCl, 0.15% with Phenylephrine HCl 1:2500 (Graham Chemical Co.): Each cc. is stated to contain procaine hydrochloride, 0.02 Gm.; tetracaine hydrochloride, 0.0015 Gm.; phenylephrine hydrochloride, 0.0004 Gm.; sodium chloride, 0.0045 Gm.; sodium bisulfite, 0.002 Gm.; methylparaben, 0.001 Gm., and distilled water. This product is accepted as a special purpose anesthetic (see *A.D.R.*, ed. 16, p. 24). The label bears the usual statement; namely, "The concentration of anesthetic agent in this product is greater than that required for routine use. Use only where anesthesia is difficult to obtain."

Aureomycin Hydrochloride[1] *(Crystalline) Capsules, 100 mg.* (Lederle Laboratories Division, American Cyanamid Co.): Each capsule is stated to contain aureomycin hydrochloride crystalline powder and excipients. See *A.D.R.*, ed. 16, p. 38.

Penicillin Buffered Tablets, 250,000, 500,000 Units (C.S.C. Pharmaceuticals): Each tablet is stated to contain potassium penicillin G crystalline and excipients. See *A.D.R.*, ed. 16, p. 45.

GROUP B

Listing of products in Group B means that there is insufficient evidence to justify their present acceptance, but there is reasonable evidence of their usefulness and safety. These products meet the other qualifications and standards established by the Council on Dental Therapeutics and the Bureau of Chemistry. It is the Council's opinion that Group B products may be promoted for special use and study.

GROUP C

Listing of products in Group C means that the evidence is so limited or inconclusive that the products cannot be accurately evaluated. It is the Council's opinion that Group C products require further study by qualified investigators.

GROUP D

Listing of products in Group D means that they are unacceptable because of their demonstrated inability to meet the standards outlined in the provisions for acceptance.

1. Patented. Patent No. 2,482,055. See A.D.R., ed. 16, p. iv.

COUNCIL ON DENTAL RESEARCH

List of certified dental materials revised to March 1, 1951

Because there has been some confusion regarding certified dental materials, the Council on Dental Research presents this summary to clarify the operation of its certification plan.

The first fundamental item in this plan is the existence of official American Dental Association Specifications for Dental Materials. These specifications are the outcome of research by the American Dental Association Research Fellowship at the National Bureau of Standards, correlated with the clinical experience of members of the Association.

As the second step in the operation of the plan, the manufacturers are invited to certify to the Council on Dental Research that their products comply with the specifications. It would be manifestly impossible for the Council (through the American Dental Association Research Fellowship at the National Bureau of Standards) to test every lot of every certified material. For this reason, the Council has required that the manufacturer, on certifying a product, not only must guarantee that this product meets specification requirements but also must furnish evidence that he maintains a testing program adequate to insure continual compliance of the product.

On receipt of a certification for a new product with all required data, the Council procures a random sample through regular trade channels, usually by asking a dentist to act as its agent. This sample is tested for compliance with all specification requirements. Only when the certification is complete and in proper form and the sample has passed all specification tests does the Council accept the manufacturer's certification. The name of the product is then added to the list of certified dental materials.

This, however, is not the complete story. The continuation of any product on the list of certified dental materials is contingent on its maintenance at specification quality. Surveys of all products on the list are made by the American Dental Association Research Fellowship at the Council's direction. These surveys are made on samples procured on the open market. Whenever a material fails to comply with the specification requirements, it is removed from the list and the manufacturer is notified that his certification of the product is no longer acceptable. Thus, although the Council cannot test the entire production of dental materials, its certification plan calls for continuous testing by the manufacturer and check tests by the Fellowship so that a constantly high level of quality of the products on the list will be maintained. Revisions of the list appear in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION from time to time.

Lately there have appeared through the mail some advertisements for amalgam alloys, mercuries, zinc phosphate cements and acrylic resins with statements that the manufacturer guarantees them to comply with the specifications of the American Dental Association. An examination of the list of certified dental materials shows that some of the materials that have been so advertised have not been certified by their manufacturers to the Council on Dental Research. The certification program is financed jointly by Federal and American Dental Association funds, and no charge whatsoever is made to the manufacturer. If a manu-

facturer is regularly testing his material, then the only expense he will have in certifying the material to the Council is the cost of the three cent stamp required for mailing the certificate and data. When a dentist sees a statement such as, "Every batch of this alloy is carefully tested before being released for shipment to be sure that it fully meets A.D.A. specifications," he should be certain to check the list of certified dental materials to see if the product appears there.

In the purchase of certified material for use in dental practice, this list should be used as a buyer's guide. In addition, the package of material received should be checked for its exact name as given in the list and for a statement thereon guaranteeing compliance with the specification. The Council should be notified of any discrepancies.

CERTIFIED AMALGAM ALLOYS (A.D.A. SPECIFICATION NO. 1)

Alloy	*Manufacturer or Distributor*
Accurate Metalloy (filings)	The L. D. Caulk Co.
Argentum "A" cut; fine cut; medium cut; shavings	Hammond Dental Mfg. Co.
Aristaloy	Baker and Co., Inc.
Banner (filings)	Goldsmith Bros. Smelting & Refining Co.
Blue Diamond (filings)	Reliance Dental Mfg. Co.
Certified	Lee S. Smith & Son Mfg. Co.
Cresilver	Crescent Dental Mfg. Co.
Dee (filings)	Dee Division of Handy and Harman
Diamond Edge	Young-Baker & Co.
Excel	Daniels Dental Alloy Co.
Fellowship; New Fellowship	Dental Protective Supply Co.
Fleck's	Mizzy, Inc.
Garfield's	Garfield Smelting and Refining Co.
Gold Bond	Jefferson Laboratories
Lustraloy Regular; Cut T	Pfingst & Co.
Minimax (filings) 173; 177; 178; 183; White Gold & Platinum; (shavings) 177; 178	The Minimax Co.
Mission No. 5; No. 5 "A" Cut; No. 6	Henry F. Bruce Co.
Modeloy (quick setting filings)	Crescent Dental Mfg. Co.
Mynol Improved	Mynol Chemical Co.
National Dental	Eskay Dental Products
New Deal	Miller Dental Co.
Odontographic "Improved" (filings)	Odontographic Mfg. Co.
Pearlol	Wildberg Bros. Smelting & Refining Co.
Precision	Precision Bur Co.
Research Oralloy	Precious Metals Research Works, Inc.
Royal Special First Setting; Super First Setting	Garhart Dental Specialty Co.
Safco 69	Safco Laboratories
Silver Crown Fast; Medium; Slow; Non Zinc	General Refineries, Inc.
Silverloy (filings); (shavings)	Crescent Dental Mfg. Co.
Speyer	Speyer Smelting and Refining Co.
S-C Medium (filings)	Stratford-Cookson Co.
S-R	Lee S. Smith & Son Mfg. Co.
Standard	Standard Dental Products Co.
Stratco	Edward P. Stratt
True Dentalloy (filings); (cut "A")	The S. S. White Dental Mfg. Co.
Twentieth Century Regular; Special; Fine cut alloy	The L. D. Caulk Co.

Uniform	Philadelphia Dental Supply Co.
Vertex	Vertex Dental Products Co.
White Beauty	Lang Dental Mfg. Co.

CERTIFIED INLAY CASTING INVESTMENTS (A.D.A. SPECIFICATION NO. 2)

Investment	*Manufacturer or Distributor*
Beauty Cast	Whip-Mix Corp., Inc.
Kerr Cristobalite-Inlay	Kerr Dental Mfg. Co.
Ransom and Randolph Gray	The Ransom & Randolph Co.
Security Improved Inlay	The Cleveland Dental Mfg. Co.
Steele's-Super	The Ransom & Randolph Co.

CERTIFIED IMPRESSION COMPOUNDS (A.D.A. SPECIFICATION NO. 3)

Compound	*Type*	*Manufacturer or Distributor*
Certified	I	Lee S. Smith & Son Mfg. Co.
Dresch	I	The Ransom & Randolph Co.
Exact	I	The S. S. White Dental Mfg. Co.
Kerr Perfection; No. 2 Soft Green; Gray	I	Kerr Dental Mfg. Co.
Mizzy—Low Heat	I	Mizzy, Inc.
S. S. White—Black—Tray	II	The S. S. White Dental Mfg. Co.

CERTIFIED INLAY CASTING WAXES (A.D.A. SPECIFICATION NO. 4)

Wax	*Manufacturer or Distributor*
Caulk-Blue	The L. D. Caulk Co.
Kerr-Blue—Hard	Kerr Dental Mfg. Co.
Security	The Cleveland Dental Mfg. Co.
Sterling	Baker & Co., Inc.
Taggart's-Blue	Mizzy, Inc.

CERTIFIED INLAY CASTING GOLD ALLOYS (A.D.A. SPECIFICATION NO. 5)

TYPE A, SOFT

Alloy	*Manufacturer or Distributor*
Aderer-A-Soft	Julius Aderer, Inc.
Baker Inlay Soft	Baker & Co., Inc.
Bruce "A"	Henry F. Bruce Co.
Chilcast No. 1	Vernon-Benshoff Co.
Coe 1	Coe Laboratories, Inc.
Crown Inlay No. 2 Soft; K	General Refineries, Inc.
Decone	Dee Division of Handy and Harman
GB Inlay No. 1 Soft	Goldsmith Bros. Smelting & Refining Co.
Jelenko Special Inlay	J. F. Jelenko & Co., Inc.
Krause Soft Inlay	Krause Gold Refinery
Ney-Oro A; AA	The J. M. Ney Co.
Research A	Precious Metals Research Works, Inc.
Spyco Soft; Eleven	Spyco Smelting & Refining Co.
S. S. White No 2; 900 Soft; 940 Very Soft	The S. S. White Dental Mfg. Co.
Stern S	I. Stern & Co., Inc.
Wildberg A-2	Wildberg Bros. Smelting & Refining Co.
Wilkinson 2S	Wilkinson Co.
Williams Inlay 3; Will-Cast 22	The Williams Gold Refining Co., Inc.

TYPE B, MEDIUM

Alloy	*Manufacturer or Distributor*
Aderer-B-Medium	Julius Aderer, Inc.
Baker Inlay Medium	Baker & Co., Inc.
Bruce "O"	Henry F. Bruce Co.
Chilcast M; 1M; 2M	Vernon-Benshoff Co.
Coe 2	Coe Laboratories, Inc.
Crown Inlay No. 1 Hard; Knapp No. 2; T	General Refineries, Inc.
Deetwo	Dee Division of Handy and Harman
GB Inlay No. 2 Medium Hard	Goldsmith Bros. Smelting & Refining Co.
Jelenko Modulay; Platincast	J. F. Jelenko & Co., Inc.
Krause Hard Inlay	Krause Gold Refinery
Ney-Oro A-1; A-10	The J. M. Ney Co.
Spyco Inlay; Medium; Tinker one	Spyco Smelting & Refining Co.
S. S. White No. 1; No. 5; No. 820	The S. S. White Dental Mfg. Co.
Stern 1; No. 3290	I. Stern & Co., Inc.
Wildberg "A"; C-2	Wildberg Bros. Smelting & Refining Co.
Wilkinson 8M	Wilkinson Co.
Williams Pioneer; Special Inlay; One "Inlay"	The Williams Gold Refining Co., Inc.

TYPE C, HARD

Alloy	*Manufacturer or Distributor*
Aderer-C-Hard; "Dressel"	Julius Aderer, Inc.
Baker Hard Inlay	Baker & Co., Inc.
Bruce No. 5	Henry F. Bruce Co.
Chilcast No. 2; No. 2-H	Vernon-Benshoff Co.
Coe 3	Coe Laboratories, Inc.
Crown No. 9; Kapp No. 3; Supreme Inlay; TT	General Refineries, Inc.
Deesix	Dee Division of Handy and Harman
GB Inlay No. 3 Hard	Goldsmith Bros. Smelting & Refining Co.
Jelenko Durocast; Firmilay	J. F. Jelenko & Co., Inc.
Ney-Oro B; B-2; BW	The J. M. Ney Co.
Research No. 5; "Inlay"	Precious Metals Research Works, Inc.
Spyco No. 1-H; Six; Tinker No. 2	Spyco Smelting & Refining Co.
S. S. White No. 8; No. 13; 860 Hard	The S. S. White Dental Mfg. Co.
Stern 2; 3337; 3465; H	I. Stern & Co., Inc.
Wildberg "C"; B	Wildberg Bros. Smelting & Refining Co.
Williams Klondiker; Special "Four"	The Williams Gold Refining Co., Inc.

CERTIFIED DENTAL MERCURIES (A.D.A. SPECIFICATION NO. 6)

Mercury	*Manufacturer or Distributor*
Argentum	Hammond Dental Mfg. Co.
Ballard's	Quicksilver Producers Association
Certified	Lee S. Smith & Son Mfg. Co.
Chemically Pure	The S. S. White Dental Mfg. Co.
Crown	General Refineries, Inc.
Dee	Dee Division of Handy and Harman
Dental	Goldsmith Bros. Smelting & Refining Co.
Dental	Drug Laboratories, Inc.
Dental, C. P.	F. W. Berk & Co., Inc.
Fellowship	Dental Protective Supply Co.
Garfield's	Garfield Smelting and Refining Co.
Garhart's Positively Pure	Garhart Dental Specialty Co.
Krause's Pure	Krause Gold Refineries
Mercury C. P.	Metalsalts Corp.

Mercury C. P.	Wildberg Bros. Smelting & Refining Co.
Minimax	The Minimax Co.
Mission	Henry F. Bruce Co.
Mynol	Mynol Chemical Co.
Ney's C. P.	The J. M. Ney Co.
Odontographic	Odontographic Mfg. Co.
Research	Precious Metals Research Works, Inc.
Spectropure	Baker & Co., Inc.
Twentieth Century	The L. D. Caulk Co.
Williams	The Williams Gold Refining Co., Inc. (Applies to Williams' one pound bottles only, as quarter pound containers are not glass.)

CERTIFIED WROUGHT GOLD WIRE ALLOYS (A.D.A. SPECIFICATION NO. 7)

Alloy	*Manufacturer or Distributor*
Aderer No. 1; No. 3; No. 4; No. 20 Clasp	Julius Aderer, Inc.
Baker 21; Q. A.	Baker & Co., Inc.
Crown Hylastic	General Refineries, Inc.
Deepep-Hard	Dee Division of Handy and Harman
GB Extra High Fusing; Medium Fusing; Regular High Fusing	Goldsmith Bros. Smelting & Refining Co.
Jelenko No. 3 Wire; Super Wire	J. F. Jelenko & Co., Inc.
Ney-Oro Elastic No. 4; Neydium 9	The J. M. Ney Co.
Spyco No. 2; No. 4	Spyco Smelting & Refining Co.
S. S. White No. 12; No. 61 Metalba	The S. S. White Dental Mfg. Co.
Stern No. 2657	I. Stern and Co., Inc.
Williams No. 1 Super; No. 2 High Fusing Clasp; No. 3 High Tensile	The Williams Gold Refining Co., Inc.
Vernon-Benshoff Clasp Wire No. 6	Vernon-Benshoff Co.

CERTIFIED ZINC PHOSPHATE CEMENTS (A.D.A. SPECIFICATION NO. 8, FIRST REVISION)

Cement	*Manufacturer or Distributor*
Ames Z-M	The W. V-B Ames Co.
Bosworth's Zinc	Harry J. Bosworth Co.
Caulk Crown and Bridge; Petroid Improved; Tenacin	The L. D. Caulk Co.
Certicem	Lee S. Smith & Son Mfg. Co.
Fleck's Extraordinary	Mizzy, Inc.
Lang Crown Bridge and Inlay	Lang Dental Mfg. Co.
S-C	Stratford-Cookson Co.
Smith's	Lee S. Smith & Son Mfg. Co.
S. S. White Silver Improved; Zinc; Zinc Improved	The S. S. White Dental Mfg. Co.

CERTIFIED SILICATE CEMENTS (A.D.A. SPECIFICATION NO. 9)

Cement	*Manufacturer or Distributor*
Ames Plastic Porcelain	The W. V-B Ames Co.
Astralit	Premier Dental Products Co.
Baker Plastic Porcelain	Baker & Co., Inc.
Diafil	Pfingst & Co., Inc.
DeTrey's Synthetic Porcelain	The L. D. Caulk Co.
Durodent Enamel	Oskar Schaefer
Smith's Certified Enamel Improved	Lee S. Smith & Son Mfg. Co.
S. S. White Filling Porcelain Improved	The S. S. White Dental Mfg. Co.

CERTIFIED HYDROCOLLOIDAL IMPRESSION MATERIALS—AGAR TYPE (A.D.A. SPECIFICATION NO. 11)

Material	*Manufacturer or Distributor*
Coe-Loid 66	Coe Laboratories, Inc.
Deelastic	Dee Division of Handy and Harman
Dentocoll	The L. D. Caulk Co.
Kerr Hydro-Colloid	Kerr Dental Mfg. Co.
Perfectocoll	Baker & Co., Inc.
Plasticoll	Lee S. Smith & Son Mfg. Co.
Surgident	Surgident, Ltd.

CERTIFIED DENTURE RESINS (A.D.A. SPECIFICATION NO. 12)

Material	*Form*	*Manufacturer or Distributor*
Acralite	Clear; pink; powder-liquid	Acralite Co., Inc.
Ac-Ril	Pink; powder-liquid	Ac-Ril Dental Corporation
Acri-Lux	Pink; powder-liquid	Acri-Lux Dental Mfg. Co.
B-B	Clear; pink; powder-liquid	Bell Dental Products Co.
Certified	Clear; pink; powder-liquid	Lee S. Smith & Son Mfg. Co.
Coralite	Pink; powder-liquid	Coralite Dental Products Co.
Crystolex, Regular	Pink; powder-liquid	Kerr Dental Mfg. Co.
Crystolex, Form 102	Pink; powder-liquid	
Densene 33	Clear; pink; powder-liquid	Cosmos Dental Products, Inc.
Denture Acrylic	Clear; pink; powder-liquid	The S. S. White Dental Mfg. Co.
Hygienic	Pink; powder-liquid	The Hygienic Dental Rubber Co.
Justi-Tone	Pink; powder-liquid	H. D. Justi & Son, Inc.
Lang's	Pink; powder-liquid	Lang Dental Mfg. Co.
Loktone	Clear; pink; powder-liquid	Myerson Tooth Corporation
Lucitone	Clear; pink; plastic cake Clear; pink powder-liquid	The L. D. Caulk Co.
Luxene 44	Pink; plastic cake	Luxene, Inc.
Marvel	Pink; powder-liquid	Marvel Dental Products Co.
Miacryl	Pink; powder-liquid	The Motloid Co., Inc.
Perma Cryl	Pink; powder-liquid	Acri-Lux Dental Mfg. Co.
Premier	Clear; pink; powder-liquid	Premier Dental Products Co.
Opalex "45"	Pink; powder-liquid	The Opalex Co.
Standard Brand	Pink; powder-liquid	Ray Foster Dental Supplies
Vernonite	Clear; pink; plastic cake Pink; powder-liquid	Vernon-Benshoff Co.
Vitacrilic D, L	Pink; powder-liquid	Fricke Dental Mfg. Co.
Vita-Lite	Clear; pink; powder-liquid	Vita-Lite Products Co.
Vitalon	Pink; powder-liquid	Austenal Laboratories, Inc.

LON W. MORREY, D.D.S., EDITOR

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Editorials

Dentistry's position in the modern public health department

The reorganization of the Illinois State Department of Public Health,[1] which has been under way for many months, calls attention to a problem which has confronted public health officials for several years—the problem of modernizing administrative machinery in order to serve the public more effectively. Late last August, Illinois authorities decided to segment the activities of the state department of health into six major divisions, exclusive of dentistry. After further study, requested by the state dental society, it was concluded that the state health department could function best through seven major divisions including a division of dental health. The new plan goes into effect July 1. The establishment of a separate division of dental health by Illinois is significant, since it indicates that at least one of America's more populous states recognizes the importance of preventive dentistry in a public health program.

Illinois is not the only state to recognize the need of modernizing its department of health. Several other states are considering the same procedure in order to supply the increased services demanded by a health enlightened public. Whereas formerly public health administrators were concerned primarily with problems of sanitation and communicable disease, today they are burdened with a multitude of responsibilities relating to all aspects of human disorders. Since the turn of the century, each decade has found new activities added to old, and old activities expanded so that the simple administrative structure of many health departments now resembles a patchwork pattern of odd shapes and design.

Realizing that such heterogeneous patterns militate against efficiency, a number of representatives of the United States Public Health Service, the American Public Health Association and schools of public health have recommended that the administrative structure of health departments be modernized. The American Dental Association is in full accord with any practical proposal which will improve the services provided by public institutions. However, some public health consultants, apparently unimpressed with the importance and responsibilities of public health dentistry, recommend that departments of health place the dental unit in a subordinate position rather than on a parity with other major divisions. To this type of planning the Association cannot subscribe. The Association, which has never been consulted officially in the preparation of these organization plans, has expressed its position in a resolution adopted by the House of Delegates last November, part of which is as follows:

Resolved, that the American Dental Association recommend to the American Public Health Association, the U. S. Public Health Service, the Association of State and Territorial Health Officers and allied agencies and commissions that dentistry be made a basic health service in all official state and community health programs, and, be it further

Resolved, that a qualified, full-time public health dentist who will have complete parity with medical or other personnel who are directly responsible to the state health director, be employed to direct and administer state public health dental programs, and, be it further

Resolved, that all state dental societies be requested to take official action to see that these recommendations and resolutions are fulfilled as rapidly as possible through whatever ethical channels are necessary, including legislation to prevent *administrative control of* public health dentistry from being relegated to other professions in health departments throughout the United States.

As pointed out in the article entitled "Dental Administration in State Health Departments," on page 61 of this issue of THE JOURNAL, those who would reduce the dental unit to a minor administrative level apparently labor under the false assumption that dentistry can function best as a subsection of one of the medical divisions. Dentistry is not a subdivision of medicine. It is an entity within itself. It has its own discipline, education and responsibilities. It is concerned with one of the largest single health problems that confront humanity. It functions best independently but in full cooperation with other specialties in the health field.

The dental director must serve as a liaison officer between the dental society and the administrator of the state department of health. Experience has proved that if the dental director does not have free and direct access to his chief administrative officer, but must work through an intermediary officer unschooled in dental problems and sometimes indifferent to them, major policies concerning the administration of the dental unit suffer.

Because dental disease is a serious and universal disorder, because its eradication will contribute materially toward raising the standards of health, because new and more effective methods of preventing dental disease now are available, and others promised, and because the effectiveness of a public dental health program depends on the closest cooperation between the public health administrator and the dental society, it is important that the dental unit be a major division of a state health department, on the same administrative level as other major divisions.

Those in charge of reorganizing the Department of Public Health in Illinois have arrived at a similar conclusion. After carefully considering every aspect of health in the state, they have decided that the dental health problem in Illinois is of such magnitude that it can best be attacked by a dental division in the state health de-

partment with a director immediately responsible to the administrator. Public health officials and dental societies across the country will watch closely the progress of the modernized public health program in Illinois as it may well furnish a practical administrative pattern for other states.

1. State society wins fight for state dental division. J.A.D.A. 42:704 (June) 1951.

Revitalization of relief fund program brings beneficial results

Now that the 1950-51 Relief Fund campaign of the Association is ended, it is time to look at the ledger. On the whole the program was very successful. Although the goal of $100,000 established by the Council on Relief was not reached, the objective was almost obtained as total contributions amounted to $90,711.65.

Southern California won first honors as it led all other constituent societies by contributing almost $9,500, or 213 per cent of its quota. Alabama took second place with $1,611.50, or 207 per cent of its quota. Thanks to the excellent promotional work of the Council on Relief and the constituent dental society committees, 27 states contributed more than their proportional share. Besides Southern California and Alabama they were: Alaska, Arizona, Arkansas, Colorado, the District of Columbia, Florida, Georgia, Hawaii, Idaho, Kentucky, Maryland, Mississippi, Montana, Nebraska, Nevada, New Jersey, New Mexico, North Carolina, North Dakota, Oklahoma, Oregon, the Panama Canal Zone, Tennessee, Utah and Washington.

Although the Relief Fund is one of the oldest continuous activities of the Association, it long has been the least understood and appreciated by members. Established in 1907 it remained in relative obscurity for almost 40 years although during that period it furnished aid to hundreds of financially distressed dentists. In 1948 the Council on Relief was reorganized and the Relief Fund established as a living trust, the resources of which are separate and distinct from those of the Association. The sale of Relief Seals each year end stimulates contributions by members and others interested in the profession. One half of the contributions is returned to the states from which they originated, to be used by the constituent societies for relief purposes. The remaining half is deposited in the American Dental Association Relief Fund which now amounts to $688,849. Only the interest from this fund can be used for relief purposes. The Association's share of a relief grant is matched by contributions from the constituent societies to meet the needs of worthy distressed dentists and their families.

The reorganization of the Council on Relief and the revitalization of its activities have enabled the profession to more than double receipts from the annual sale of Relief Seals since 1945. Although this in itself is no mean achievement, the new program of the Council has accomplished much more. It has brought about a better understanding on the part of all dentists regarding the purposes of the Fund. It has

demonstrated what can be achieved through cooperative effort and it has raised the profession's sights with respect to its own resources and potentialities. Whereas a few years ago the average annual contribution was but 70 cents, last year it was doubled to $1.40. It is not inconceivable that in the near future members in all states will follow the example set by Southern California and thereby double the present average contribution to $2.80 or $3.00. In fact, an average annual contribution of $5.00 is not beyond the realm of reason. When every member of the profession raises his sights to that level, modest though it may be, the resources of the Relief Fund of the Association will be such that few dentists need be concerned over the possibility of spending their declining years in want and deprivation. Plans now are in the making for next year's Relief Fund campaign. Plan now to double your last year's contribution.

Bevan and social security retreat before the advances of national safety

Mr. Aneurin Bevan has resigned and his resignation cannot pass without comment. Formerly Minister of Health of Great Britain and more recently Minister of Labor, he gave as one of his reasons the revision of the National Health Service. Proponent of socialization, leader in the Labor Party, leveler of wealth and resources, Mr. Bevan chose to bow out of political prominence rather than approve expenditures for national defense at the expense of his social program.

As Minister of Health, Mr. Bevan fathered the British National Health Service. Designed to assure the citizens of Britain complete dental and medical care, to be paid for entirely through taxation, the system virtually nationalized the dental and medical professions. Now, after three short years, the British Government has decided, because of rising costs, that it can no longer furnish free certain types of health services, notably eyeglasses and artificial dentures. Henceforth patients will be required to pay 50 per cent of the charge for such appliances. The Government hastens to promise, however, that these extra charges are temporary and that they will be removed as soon as the national economy will permit—a political promise with a very familiar ring.

As a leading proponent of socialization, Mr. Bevan reasoned that by rearranging the national economy he could provide all of his people with the basic necessities and some of the luxuries of life. Time and experience have proved his reasoning wrong. The pound, like the dollar, will stretch just so far. When that point is reached retrenchment must follow. When expenses exceed income, whether it be in a national health program, other branches of government, or private business, services must be curtailed or extra charges added.

Some day, perhaps, people will accept the grand promises of politicians in the spirit in which they are given.

Washington News Letter

A thorough stocktaking of national developments in fluoridation of water supplies was made at the fourth annual conference of state dental directors in Washington June 6-8. Attended by representatives of 42 states and territories and the District of Columbia, as well as the American Dental Association, the meeting's discussions disclosed marked progress in the year that has elapsed since community fluoridation was officially endorsed at the directors' 1950 conference.

The dental practitioner's role, engineering problems, public education, political ramifications, straightening out misconceptions about fluoridation—these were among the aspects considered at the state dental leaders' meetings with officials of U.S. Public Health Service and the Children's Bureau. A statistical report disclosed that 88 municipalities are now treating their water systems and scores more are in process of initiating programs.

Round table discussions and presentation of papers brought out the following points, among others:

1. Fluoridation is a partial caries-control procedure that does not take the place of other dental health measures. F. A. Bull, of the Wisconsin State Board of Health, described it as a stepping stone toward effectuation of a complete dental program.

2. No harmful or deleterious effects have resulted when recommended fluoride concentrations were maintained, nor has chemicalizing of water supplies been inimical to laundries, bakeries, bottling works, breweries or other large-volume users of water.

3. Expansion of the program will be conducive to conservation and optimal utilization of the nation's dental manpower.

4. Periodic evaluation of results is desirable for purposes of measuring progress in dental health, standardizing technics and furnishing an incentive for development and perpetuation of a well-rounded dental public health program.

5. Data should be collected to establish age-specific DMF and DEF rates per 100 children, aged 5 to 15, inclusive. Examinations should cover all children in small communities and, in larger areas, a minimum of 200 boys and girls in each age group should receive periodic dental examinations as part of the appraisal program. It was also recommended that large cities take cognizance of such factors as economic levels, race, geographical distribution, and so forth.

6. Initiation and promotion of a program is the responsibility of state and local dental societies, in collaboration with dental public health authorities. The state's health department is responsible for establishment of technical standards and procedures, including the training of water plant operators in testing and safety procedures.

PUBLIC HEALTH SERVICE BUDGET

Drastic economy measures taken by the Senate in mid-June made it clear that the Public Health Service budget for 1951-52, when it is completed and placed in effect in July, will have its funds for research and other dental health activities sharply curtailed. Not only has the request been denied for appropriations to erect a building for National Dental Research Institute but deep cuts have been made all across the board.

NATIONAL DENTAL RESEARCH ADVISORY COUNCIL

Accordingly, it is still unknown to what degree the recommendations made by National Dental Research Advisory Council at its recent spring meeting will be carried out. Forty applications for research grants were considered, aggregating $303,023 in value. Of these, 30 were approved, involving a Federal outlay of $191,901. Impending budgetary reductions, however, may require either that some of the approved projects be deferred or, if all 30 are endorsed by the Surgeon General upon recommendation of the Council, that some or all of the grants undergo a financial trimming.

The Council's meeting, incidentally, was the last one for three members whose terms have expired: Harold Hillenbrand, American Dental Association; Henry F. Vaughan, University of Michigan, and Hazel Halloran, of New York City.

VETERANS ADMINISTRATION

Although the Government's new fiscal year begins on July 1, uncertainty also surrounds the availability of funds for continuance of the Veterans Administration "home town" dental service program.

For the year's first quarter — July, August and September—$9,000,000 has been earmarked for fee payments covering treatments and examinations, but it remains to be seen whether the full sum will be allocated. To pay for dental consultants' services, VA has approved $90,000 for the same three-month period. As of April 30, the latest date for which figures are in hand, 151,122 veterans were on the waiting list for outpatient dental care.

Bion R. East, chief of Dental Services, has announced that his advisory council will meet here on July 16. Its chairman is Paul Jeserich, of the University of Michigan.

ARMY DENTAL SERVICE

Army dental service is planning to institute certain changes in utilization of its officers and enlisted personnel in the interest of conserving professional manpower and facilitating patient care. Military authorities explained that the impending revision of tables of organization will not affect the present ratio of two dental officers per 1,000 troop strength.

Briefly, the plan calls for establishment of dental teams and detachments, some mobile and others in fixed locations within military operational areas, ranging in size from one to 25 dental officers, with enlisted auxiliaries in addition. Soldiers will receive their dental care from these groups, instead of from personnel attached to their respective military units. Hospitals and divisions are not affected by the change, however.

Among other advantages, it was explained, will be that of placing control of dental activities and procedures more directly under the dental service, inasmuch as military units, other than hospitals and divisions, are to be relieved of dental personnel heretofore assigned to them and the newly formed teams will be commanded by dental officers. The plan also was described as one that will eliminate unnecessary travel by dental officers, enabling them to give a larger share of attention to professional duties.

Association Affairs

ANNUAL SESSION TO FEATURE COLOR TELEVISION CLINICS

For the first time in the history of dentistry, color television will be utilized this year in the scientific session of the American Dental Association. Harold W. Oppice, president, on October 16 will open a three-day series of morning and afternoon television clinics at the ninety-second annual session in Washington, D.C.

The program will include 25 quarter-hour and half-hour presentations in which an audience of approximately 350 persons, seated before ten television sets in the National Guard Armory, will virtually watch over the shoulders of eminent authorities operating in the Mount Alto Veterans Administration Hospital six miles away, and listen to their accompanying explanations and comments. William A. Garrett of Atlanta, chairman of the Council on Scientific Session, has reported that each clinician will accompany his demonstration with explanatory comments on study models, to clarify each step in his procedure.

The program is being arranged by a subcommittee appointed by Dr. Garrett, members of which are Lester W. Burket of Philadelphia, member of the Council on Dental Therapeutics; Marcus H. Burton of Washington, chairman of the Section on Clinics; J. L. Bernier of Washington, chief of the oral pathology section of the Armed Forces Institute of Pathology and secretary of the Association's Oral Pathology Registry; as well as Wilbur D. Johnston of New Haven, Conn., and Robert G. Kesel of Chicago, member and secretary, respectively, of the Council on Scientific Session.

The program will be sponsored by E. R. Squibb & Sons. Technical apparatus for the Columbia Broadcasting System color television will be supplied and operated by Remington Rand, Inc.

Attendance will be limited by registration. The complete three-day program of morning and afternoon telecasts will be published in the September issue of THE JOURNAL.

Housing Bureau • The Housing Bureau has reported a great demand for accommodations at Washington hotels, and has urged that members planning to attend the session take advantage of the form provided for their convenience on page A-55.

MISSION TO AID JAPANESE DENTISTRY IS ON ITS WAY

Five representatives of the Association left Seattle June 30 on a mission to Japan to aid the Japanese dental society to further dental progress in that country.

Members of the mission, authorized by the Board of Trustees at its March 1951 session, are Harold W. Oppice of Chicago, president; LeRoy M. Ennis of Philadelphia, president-elect; R. C. Dalgleish of Salt Lake City, trustee from the Thirteenth District; Stanley D. Tylman of Chicago, chairman of the Council on International Relations; and George C. Paffenbarger of Washington, research associate at the National Bureau of Standards.

The purpose of the mission, stated last year in a communication from the Supreme Commander for the Allied Powers, who issued the invitation with Defense Department approval, is "to render advice in matters of dental education, par-

ticularly the . . . curriculum, to present the American views on dental service in relation to social insurance and . . . on the subject of oral hygiene and preventive dentistry and the more recent advances on the use of dental materials and techniques."

PEARLMAN JOINS STAFF OF COUNCIL ON THERAPEUTICS

The appointment of Sholom Pearlman of Cleveland as assistant secretary of the Council on Dental Therapeutics has been announced by Harold Hillenbrand, secretary of the Association.

Before accepting his present appointment, Dr. Pearlman was an instructor in biochemistry at the Western Reserve

S. Pearlman

School of Dentistry, and a research assistant in biochemistry at the medical school. For the past year he worked with Thomas J. Hill, professor of clinical oral pathology and therapeutics in the dental school, on investigations concerning a hyperglycemic factor in the saliva. His other research activities have included a study on the effects of ammonia and urea on a pure culture of *Lactobacillus acidophilus,* and a study on dental caries and lactobacillus counts in mental patients undergoing insulin shock. He has a D.D.S. degree from the University of Toronto dental school, and an M.S. degree in biochemistry from Western Reserve.

In his new position, Dr. Pearlman will assist J. Roy Doty, secretary of the Council on Dental Therapeutics, in the various activities of that Council and the Bureau of Chemistry of the Association.

NEW FLUORIDATION LEAFLET FOR PUBLIC IS AVAILABLE

A leaflet designed to acquaint the public with the facts regarding fluoridation in the prevention of tooth decay has been prepared by the Council on Dental Health of the Association and is available on request from the Central Office.

Entitled *Fluoride . . . Less Tooth Decay,* the pamphlet answers questions with regard to the value of fluoridation of water supplies and the topical application of sodium fluoride, the nature of fluorine, and how the fluoride treatment was discovered.

Orders should be addressed to the Order Department, American Dental Association, 222 East Superior Street, Chicago 11. A sample copy will be supplied on request.

COUNCIL ON JOURNALISM PLANS STANDARD ADVERTISING RATES

Preliminary plans for developing a formula that will provide a sound basis for determining advertising space rates in publications of constituent dental societies were developed by the Council on Journalism of the Association at a meeting held June 9 in the Central Office.

The lack of uniformity in space rates with relation to total circulation was reported by J. J. Hollister, business manager of the Association, from the results of a recent survey by the Council. Largest circulation figures were the *New York State Dental Journal,* 11,043; *Illinois Dental Journal,* 6,033; *Pennsylvania Dental Journal,* 5,800; *Ohio State Dental Journal,* 3,600; *Journal of the Southern California State Dental Association,* 3,300.

Two representatives of the American Association of Dental Editors attended the meeting, at which plans were made for the joint meeting of the A.A.D.E. with the Council at the ninety-second annual session of the Association in Washington in October. They were Wm. P. Schoen, Jr., of Chicago, president; and James H. Keith of Evanston, Ill., editor of the *Fortnightly Review of the Chicago Dental Society*. Council members in attendance were Charles A. Wilkie of Brooklyn, chairman; Joseph W. Jones of Dawson Spring, Ky.; W. L. Barnum of Portland, Ore.; and Lon W. Morrey, editor of the Association and member ex officio.

DENTAL MANUFACTURERS URGED TO FOLLOW A.D.A. ACTIONS

J. J. Hollister, business manager of the Association, urged dental manufacturers to keep informed regarding actions of the Association, when he spoke on June 16 at the annual meeting of the Dental Manufacturers of America in Shawnee-on-Delaware, Pa. Every manufacturer ought to have a file of the official *Transactions* in his library, he told them, since "knowledge of the A.D.A. policy is often essential to sound planning in the dental industry."

Describing the activities of the various Councils that have influence on the dental trade, Mr. Hollister urged the manufacturers to avail themselves of the Councils' services in a cooperative effort with the Association to improve the dental health of the public.

For example, the Council on Dental Therapeutics, he said, which is now recognized as "a fair and impartial standardizing agency whose sole interest is the protection of the public and the dental profession through the elevation of therapeutics standards, . . . has made invaluable contributions [to the marketing of a product] that have saved the manufacturers many thousands of dollars, and in some instances embarrassment as well."

Mr. Hollister also suggested that the manufacturers take advantage of the services provided by the Association's

The Thomas P. Hinman Research Building of the Georgia Institute of Technology was dedicated April 27 as a memorial to the late Dr. Hinman, 1915-16 president of the American Dental Association, and founder of the Atlanta Midwinter Clinic named after him. Georgia dentists and educators shown here by the memorial plaque at the entrance to building, are (l. to r.) J. A. Broach of Atlanta, R. D. Robinson of Atlanta, Jos. O. Eberhart of Atlanta, R. T. Simpson of Atlanta; Hilton M. Fuller of Atlanta, president-elect of the Fifth District Dental Society; Thad Morrison, Sr., and Thad Morrison, Jr., of Atlanta, Col. Blake R. Van Leer, president of the Georgia Institute of Technology; and Frank A. Daniel of Atlanta. Insert is P. D. McCormack of Atlanta, president of the Fifth District Dental Society.

Bureau of Library and Indexing, that each salesman calling on dentists carry with him a copy of the catalog of dental health educational material supplied by the Council on Dental Health, and that the services of the Bureau of Economic Research and Statistics be used as a source of material in the manufacturers' market research.

ASSOCIATION MEMBERSHIP INCREASED 3,852 IN MAY

Membership in the Association increased by 3,852 during May, bringing the total as of May 31 to 71,885 members. Student members totaled 9,015, an increase of approximately 2,000 over a year ago. The figures were announced by H. C. Jarvis of Cincinnati, chairman of the Council on Membership.

LOYOLA (CHICAGO) STUDENT MEMBERS STAGE CLINIC DAY

Students at Loyola University dental school, Chicago, wound up their first year of activities as student members of the Association with a "Student Clinic Day" program on May 18, at which they presented clinics and original papers.

Officers of the group are James Estaver, chairman; Luther Watson, vice-chairman; and E. F. Lidge, Jr., secretary.

Dental Societies

TWENTY-TWO STATE SOCIETY SECRETARIES MEET IN CHICAGO

Twenty-two secretaries of state dental societies attended the fourth State Secretaries' Management Conference June 11-13 in the Central Office. They were: Don M. Hamm, Arkansas; Earle S. Arnold, Connecticut; John G. Rooks, executive secretary, California; Virginia L. Kellogg, executive secretary, Florida; Paul W. Clopper, Illinois; E. E. Ewbank, and Mrs. R. E. Simpers, assistant secretary, Indiana; Julian S. Barnhard, Louisiana; Harold E. Tingley, Massachusetts; Fred Wertheimer, and H. C. Gerber, Jr., executive secretary, Michigan; H. M. Campbell, Mississippi; Betty Satterfield, executive secretary, Missouri; C. S. Renouard, Montana; F. A. Pierson, Nebraska; Charles A. Wilkie, New York; H. Leon Snow, executive secretary, Oklahoma; Ray Cobaugh, executive secretary, Pennsylvania; Morris L. Biderman, recording secretary, Rhode Island; T. T. McLean, executive secretary, and Wayne L. McCulley, Tennessee; A. B. Drake, West Virginia; and Kenneth F. Crane, executive secretary, Wisconsin. Karl S. Richardson, executive secretary of the Chicago Dental Society, also attended the meeting.

A presentation on "The Anatomy of the Constituent Society" by L. M. Cruttenden, assistant secretary of the Association, was discussed by Earle S. Arnold of West Hartford, Conn., and F. A. Pierson of Lincoln, Neb. Dr. Cruttenden stressed the importance, to the success of a national program involving dentistry, of reaching the members of the component societies. Vera A. Avery of Chicago, a file consultant, presented a discussion of the records to be kept by the constituent society secretary and the methods of establishing and maintaining a filing system. John G. Rooks of San Francisco discussed a presentation by J. J. Hollister, business manager of the Association, on the mechanics of handling membership dues collection, and other membership problems.

A presentation by Gerard J. Casey, assistant secretary of the Council on Dental Education, suggested a program for securing new members, and was discussed

by Ray Cobaugh of Harrisburg, Pa., and Don M. Hamm of Clarksville, Ark. Shailer A. Peterson, secretary of that Council, described the operation of the student aptitude testing program and conducted a practical demonstration of the test.

Harold W. Oppice, president of the Association, in a presentation regarding methods of handling complaints and referrals, stressed the necessity for such a service in a constituent society and outlined the mechanics for its establishment and maintenance. The paper was discussed by Charles A. Wilkie of Brooklyn and H. Leon Snow of Oklahoma City.

Leo W. Kremer of Chicago, chairman of the Council on Relief, described the handling of the relief program at the state society level. His presentation was discussed by T. T. McLean of Nashville, Tenn., and John J. Hollister, business manager of the Association.

After meetings in which the secretaries were divided into groups according to state membership figures, common problems of the two groups were discussed and reports on state society projects were presented.

LOWERING OF P.R. DENTAL STANDARDS VETOED BY MUNOZ

A lowering of the standards of the dental profession in Puerto Rico was prevented in May when the Governor, Luis Munoz Marin, vetoed a Senate project (SB 118) which would have allowed the practice of dentistry by improperly trained dentists. The Governor's action was taken at the instigation of the Puerto Rico Colegio de Cirujanos Dentistas and with the support of the Association.

The bill, declaring a state of emergency in the dental services in Puerto Rico, reduced the qualifications for admission to dental schools and opened the doors to the practice of dentistry by graduates of foreign schools regardless of their

In San Juan, P. R., on January 26, during the meeting of the Colegio de Cirujanos Dentistas de Puerto Rico, the mayor of San Juan, Felica Rincon de Gautier, was hostess at a luncheon in honor of Harold W. Oppice, president of the Association, and Victor E. Anderson, mayor of Lincoln, Neb. Shown here are (l. to r.) Cmdr. Edward Jeansonne, USN, D.C., commanding dental officer of the Island; Daniel F. Lynch of Washington, D.C., Fourth District trustee; Hector L. Bruno, president of the Puerto Rican dental society; Mayor Rincon de Gautier; Dr. Oppice and Mayor Anderson. Standing is Jose M. Gonzales of San Juan.

educational standards, it is reported.

Hector L. Bruno, president of the Puerto Rico constituent society, stated that the dental problem in the Islands could be solved by the establishment of an approved dental school, and by increasing the number of Government scholarships to approved dental schools in the United States.

It is understood that the program of scholarships for Puerto Rican dental students attending U.S. dental schools is soon to be expanded by a University of Puerto Rico appropriation of $40,000 for 25 scholarships.

MORRISON HONORED FOR FIFTY YEARS OF DENTAL PRACTICE

J. P. Morrison, who has practiced dentistry for more than 50 years in Mount Carmel, Pa., was honored last month at a testimonial banquet given by the Mount Carmel Dental Society. Harry L. Logan, president of the dental society, recalled that when Dr. Morrison started his practice dentistry was sometimes referred to as "tooth carpentry." It was "men like Dr. Morrison (who) brought professionalism to the practice" of dentistry, he stated, and reported that the honored guest was one of the first dentists in Pennsylvania to establish a method of gold inlaying with a device known as a "pig."

Dr. Morrison graduated in 1900 from the Pennsylvania College of Dental Surgery in Philadelphia.

DENTAL EXECUTIVE SECRETARY GROUP TO MEET IN SEPTEMBER

The Association of Dental Executive Secretaries, comprised of executive secretaries of component dental societies of the American Dental Association, will hold its sixth annual meeting September 15-16 in Buffalo at the Hotel Statler.

Further details may be obtained by writing to the secretary, Esther G. Drummey, Metropolitan District Dental Society, 227 Commonwealth Avenue, Boston 16.

GREATER NEW YORK DENTISTS PLAN DECEMBER MEETING

The Greater New York Dental Meeting, held annually by the First and Second District Dental Societies, will be held December 3-7 at the Hotel Statler, New York. General chairman is Stanley G. Standard.

Inquiries should be addressed to Room 106A, Hotel Statler, New York 1.

A. Frank Schopper (r.) was installed as president of the Missouri State Dental Association at the annual meeting April 1-4. He is shown here with Harold W. Oppice, president of the American Dental Association, who attended the meeting.

Dental Education

TUFTS DEDICATES LABORATORY TO MEMORY OF DANIEL ZISKIN

An oral pathology laboratory in the new home of the Tufts College Dental School, Boston, on May 29 was dedicated to the memory of Daniel E. Ziskin, late chairman of the division of periodontia at Columbia University School of Dental and Oral Surgery of the Faculty of Medicine.

Donated by the late Dr. Ziskin's sister, Mrs. Harry Posner, and her husband, of Medford, Mass., the laboratory will have as its director Irving Glickman of Boston, professor of oral pathology and periodontology at Tufts.

Dr. Ziskin in 1930 organized the division of oral diagnosis at Columbia and in 1945 became professor of dentistry when the Faculty of Dentistry was integrated with the Faculty of Medicine. At the time of his death, in 1948, he was chairman of the division of periodontia at Columbia. Before going to Columbia, he served on the faculty of the University of Minnesota dental school, from which he was graduated in 1917.

DENTAL SCHOOL ENROLLMENT UP 5,000 IN FIVE YEARS

Undergraduate enrollment in the nation's 42 dental schools has increased by nearly 5,000 in the last five years, according to the *Dental Students' Register* distributed by the Council on Dental Education of the Association. Total undergraduate enrollment in October 1950 was 11,891 compared with 7,274 in 1945.

The October 15 total, inclusive of undergraduate and postgraduate students, special students, and dental hygienists, was 14,570. Of the 11,891 undergraduates, 189 were from United States possessions; 40 were from Canada, and 22 were from other foreign countries.

A tabulation of admission requirements shows that seven schools require a minimum of three years' predental training; the remainder require two years'. Two schools have accelerated programs and graduate their students in three years; one has an optional accelerated program; the remainder have four-year programs.

All of the 26 schools with dental hygiene curricula give two-year programs with an average of 1,845 clock hours, according to Shailer A. Peterson, secretary of the Council, reporting on a recent survey. Admission requirements range from a high school course to two years in liberal arts.

A meeting of the Council on Dental Education has been scheduled for July 7-8 in the Central Office. Chairman is Henry M. Willits of Dubuque, Ia. The Committee on the Training of Dental Hygienists, with Otto W. Brandhorst of St. Louis as chairman, and the Committee on Dental Internships and Residencies, with J. R. Blayney of Chicago as chairman, will meet July 6.

TOOTH DECAY DISCUSSED ON CHICAGO ROUND TABLE

Three dental authorities and a biochemist engaged in research in nutrition participated in the University of Chicago Round Table discussion, broadcast on June 24 over the National Broadcasting Company network. In a program entitled "What Do We Know About Tooth Decay," the authorities discussed the causes and bacteriology of caries, diet research, ammoniated dentifrices, and fluoridation programs and their results.

The discussers were H. Trendley Dean, director of the National Institute of Dental Research, U.S. Public Health Service; C. A. Elvehjem, professor of biochemistry at the University of Wisconsin and dean of the graduate school; J. Roy Blayney, director of the Zoller Dental Clinic and

professor of dental surgery at the University of Chicago; and Frank J. Orland, associate professor of dental surgery and bacteriology at the University of Chicago.

Printed transcripts of the broadcast may be obtained for 10 cents apiece, and at a reduced cost for quantity orders, by writing to the University of Chicago Round Table, Chicago 37, Ill.

ILLINOIS TO GIVE THIRD ANNUAL TELEPHONE COURSE

The University of Illinois dental school will conduct its third annual telephone course on "Current Advances in Dentistry" this year, beginning in November and continuing through March 1952. Subjects of the monthly one-and-a-half hour lectures, which will be transmitted on a national telephone hookup to enrolled dental societies, are dental caries, the denture and the temporomandibular joint, normal and abnormal occlusion, advances in dental radiology, and oral infections.

Further information may be obtained by writing to Saul Levy, coordinator of postgraduate studies for the extension division of the University of Illinois, Dentistry, Medicine and Pharmacy Building, Room 869-C, 1853 W. Polk Street, Chicago 12.

RIVERS RECEIVES GEORGETOWN AWARD OF MERIT FOR 1951

L. Mendel Rivers, congressman from South Carolina, has received the 1951 Award of Merit of Georgetown University dental school, for his "significant contribution to the dental profession resulting in improved dental health for the people of the United States." Representative Rivers "has initiated and actively supported much legislation in the interest of the dental profession," the citation stated, and "through his constant efforts there has resulted improved and more efficient dental service, with health benefits to the defense forces, to the war veterans and to the public at large. . . ." His efforts to increase research in dentistry also were cited.

The award was presented by Rear Admiral C. V. Rault (DC) USN (Ret.), dean of the dental school, and the Reverend Edward B. Bunn, S. J., regent.

International

BELGIAN RESEARCH FOUNDATION TO BE NAMED AFTER JOACHIM

Belgian dentists are organizing a foundation for the development of scientific dental research and will name it after Albert Joachim of Brussels, editor of the *Journal Dentaire Belge* (Belgian Dental Journal), it is reported in a U.S. Public Health Service news letter.

Dr. Joachim, who is a vice-president of the Fédération Dentaire Internationale, has practiced dentistry in Belgium since 1901 and has represented his country in the F.D.I. for more than 40 years.

FRENCH DENTISTS INVITE PARTICIPATION IN CONGRESS

The Journées Dentaires de Paris has invited members of the Association to participate in its twenty-fifth international congress, to be held November 21-25 in Paris, France.

Members who wish to present papers or table clinics, or to attend the meetings, are asked to write to the secretary general, Robert Rolland, 15 Boulevard Malesherbes, Paris 8.

ASK BACK ISSUES OF JOURNALS FOR UNIVERSITY OF PARIS

A request for back issues of THE JOURNAL and the *Journal of Oral Surgery*, for the library of the University of Paris, France,

has been received from Michel Dechaume, professor of stomatology of that university.

Henry Klein, 24 Avenue Carnot, Paris, who relayed the request to the Association, has suggested that dentists with journals to donate direct them to him for delivery to the library.

CANADIAN DENTISTS TO HOLD ANNUAL MEETING IN SEPTEMBER

The Canadian Dental Association will hold its annual convention September 23-26 in Ottawa and has started to receive advance registrations. The Canadian Association reports that a large attendance is expected, and invites early application for reservations, which may be sent to H. N. Beach, 150 Metcalfe Street, Ottawa.

Headquarters of the C.D.A. is 234 St. George Street, Toronto 5, Ont.

WEST GERMAN DENTISTS LEARN FROM AMERICAN COLLEAGUES

Dentists in Western Germany this summer will be brought up to date on current advances in dentistry by a team of four American dentists, part of a mission sponsored by the Unitarian Service Committee.

The dental team will be comprised of Maury Massler, professor of graduate pedodontia at the University of Illinois dental school, whose assignment is public health dentistry and preventive dentistry; L. Rush Bailey, instructor in the clinic at the University of Indiana dental school, who will teach restorative dentistry; A. L. Roberts of Aurora, Ill., who will acquaint the Germans with modern advances in prosthetic dentistry; and Joseph Lazansky, professor of oral medicine and oral surgery at the University of Alabama dental school, who has been assigned to instruct them in oral surgery.

The mission, which has the sanction of the State Department, will also include public health and social service teams. The dental team left New York June 22 for Frankfurt, and will spend approximately one week at each of the large teaching centers, including Berlin, before returning at the end of two months.

STUDY CLUB INTERNATIONAL TO MEET IN ROME SEPT. 12-15

The General Practitioners Study Club International will hold its annual convention in Rome, Italy, September 12-15, with a program of lectures and clinics. Leaving New York September 1 by stratocruiser, the itinerary includes stops in London and Paris to attend lectures. Visits to all the European countries are included, and the return trip, starting September 25, will be routed by way of Lisbon. Total cost is $1,295.

Dentists, as well as physicians, and their families, are invited to attend the convention. Details may be obtained by writing to John O'Connell, St. Louis physician and president of the Club, at 1300 Lackland Road, St. Louis 14.

Legislation

PROPOSED BILL WOULD BENEFIT CHIEF NAVY DENTAL OFFICER

A bill (HR 4205) to provide retirement benefits for the chief of the Dental Division of the Navy Bureau of Medicine and Surgery was introduced by Rep. L. M. Rivers (D., S.C.) on May 22, and approved by a subcommittee of the Committee on Armed Services.

Effect of the bill would be to place the Navy dental chief on a par with the chief of the other Navy bureaus, by giving him the rank of rear admiral and the same pay and allowances as a major general in the Army.

A bill to provide comparable status

to the chief dental officer of U.S. Public Health Service has also been introduced (see June JOURNAL, p. 709).

SENATE COMMITTEE AMENDS USPHS DENTAL HEALTH BUDGET

The Senate Appropriations Committee on June 6 restored $197,308 of the $250,000 cut by the House from the original budget asking for U.S. Public Health Service dental health activities in 1951-52. The $1,750,000 original budget asking was cut by the House to $1,500,000 but restored by the Senate Committee to $1,697,308, a net cut from the original asking of $52,692. This amount was eliminated from the funds available to pay for personal services.

The Senate on June 12 added a rider making an over-all cut of 10 per cent in the amounts available for personal services. After action by the Senate, the bill goes to a joint conference of the two Houses.

N.C.P.T. Supports Fluoridation • Among organizations which urged restoration of cuts in dental health appropriations made by the House Committee, and the use of the funds for furtherance of water fluoridation programs, was the National Congress of Parents and Teachers, it is reported by that organization's president, Mrs. John E. Hayes of Twin Falls, Idaho. Testifying before the House Committee on May 11, Mrs. Lorin S. Stein of Washington, member of the legislative committee of the N.C.P.T., stated that her organization "does not believe that the country can afford economies in services essential to the health of its citizens in time of emergencies." Mrs. Stein reminded the Committee that the "clinical soundness" of this method of dental health protection is attested to by the American Dental Association, as well as by other national organizations interested in public health.

TEXAS DENTAL HYGIENISTS ARE TO BE LICENSED

Licensure of dental hygienists is made mandatory in Texas by a bill recently passed by the state legislature at the instigation of the Texas State Dental Society. All 48 states, the District of Columbia and Hawaii now have laws regulating the practice of dental hygienists.

Public Health

INTER-ASSOCIATION COMMITTEE STATES VIEWS ON HEALTH CARE

The Inter-Association Committee on Health has declared itself in favor of both the trend toward community health planning and the principle of national health protection through tax-supported local health services.

In a statement released on May 6, the Committee, comprised of representatives of six national health and welfare organizations including the American Dental Association, described the local "health council" as the most effective instrument for implementing community health planning and recommended continued assistance to such bodies. The Committee also recommended that assistance be given in the promotion of health councils where they do not exist.

Stating its approval of the principles behind tax supported health services, the Committee listed dental health services as one of the functions of a "well rounded program" of a tax supported health unit.

At the same time, the Committee recommended that public welfare depart-

ments be authorized to finance the purchase of dental care for persons receiving public assistance, through funds set aside for that purpose, and urged that public health departments be permitted to administer the medical aspects of such a program.

The six member organizations of the Committee are the American Dental Association, the American Medical Association, the American Hospital Association, the American Nurses Association, the American Public Health Association, and the American Public Welfare Association.

DENTAL DIRECTORS RECOMMEND PREFLUORIDATION SURVEYS

Fluoridation programs should include prefluoridation surveys in order to demonstrate the value of the program to the community by comparison with a survey made after several years of fluoridation. This was the consensus of state dental directors from 38 state health departments and three territories at their fourth annual meeting held in Washington June 6-8, according to W. Philip Phair, assistant secretary of the Council on Dental Health of the Association, who attended the meeting.

The surveys, which should include 200 or 300 children in each age group between 5 and 15 years where this is possible, should be made by the local dental society using a uniform method of inspection, the group recommended. The state dental directors stated their willingness to aid in such surveys.

Among the speakers was F. A. Bull, dental director for the Wisconsin Board of Health, who emphasized the importance of state and local dental societies in the promotion of fluoridation programs. Dr. Bull recommended the annual inclusion of fluoridation programs at state dental meetings and stressed the necessity for a positive policy by state boards of health.

TWO BOOKLETS AVAILABLE TO HELP PROMOTE FLUORIDATION

Two booklets are available as an aid in promotion of fluoridation of communal water supplies, one prepared by the U.S. Public Health Service and the other by the Council on Dental Health of the Association.

The Association's booklet, *Fluoridation in the Prevention of Dental Caries,* contains general information for the guidance of dental, medical and public health officials in recommending fluoridation to city officials. It may be obtained on request from the Central Office.

The U.S. Public Health Service, which has announced before Congressional committees, its "unqualified endorsement of the fluoridation of public water supplies as a community procedure for reducing tooth decay in children," is "actively assisting states in the promotion of fluoridation of communal water supplies," according to Bruce D. Forsyth, assistant surgeon general and chief dental officer. Its booklet, *Better Health for 5 to 14 Cents a Year Through Fluoridated Water,* was prepared for this purpose, and may be obtained by writing to the U.S. Public Health Service, Dental Division, Washington, D.C.

General

FLUORIDATION ARTICLES WIN AWARD FOR SCIENCE WRITER

Five newspaper articles on "Fluorides and Your Children's Teeth" in the *Cleveland Press,* Cleveland, Ohio, won for their author, Don Dunham, the 1950 Lasker Award of the Lasker Foundation for newspaper writing on health and medicine, it is reported.

The $500 award and a gold statuette were presented to Mr. Dunham at the dinner of the National Association of Science Writers in Washington, D.C., along with a citation stating that his

articles "so awakened the Cleveland public interest that this public has now acted to obtain for itself a great benefit."

The publicity was a major factor in the efforts of the Cleveland Dental Society to secure approval of water fluoridation by city officials.

FRANK W. ROUNDS, WELL KNOWN ORAL SURGEON, DIES

Frank W. Rounds, oral surgeon and anesthetist and former president of the Massachusetts Dental Society, the American Society of Oral Surgeons, the American Academy of Dental Science, and the New England Society of Oral Surgeons, died May 16 at his home in Boston.

Before moving to Boston in 1922, Dr. Rounds practiced dentistry in Maine and in Kentucky, and served on the faculty of the University of Louisville dental school, from which he was graduated in 1910.

For his service to dentistry he received the Fones medal award of the Connecticut Dental Society in 1948, and membership in Phi Beta Kappa in 1939. He also held honorary memberships in the Tennessee, Kentucky, Mississippi and Maine Dental Societies.

He is survived by his wife and two sons, one of whom, Charles E. Rounds, practices dentistry in Boston.

TWO NEW PRICE REGULATIONS AFFECT DENTAL PRODUCTS

Prices on various technical services, including those provided by dental laboratories, were fixed on May 16 at ceilings based on price levels prevailing between December 19, 1950 and January 25, 1951. OPS Regulation No. 34, which ordered the price ceilings, requires laboratories to post the ceiling prices, and to keep them on file in their offices and in local OPS offices. The regulation does not affect dentists.

Another order, OPS Regulation No. 22, which went into effect on May 28 for manufacturers, fixes the price for commodities that were sold between July 1, 1949 and June 24, 1950 at a ceiling based on prevailing prices for the same products during the period April 1-June 24, 1950, or on any previous calendar quarter which ended not later than September 30, 1949. The regulation applies to suppliers of dental products.

COLLEGE OF DENTISTS TO MEET IN WASHINGTON IN OCTOBER

The American College of Dentists will hold a convocation in Washington, D.C. on October 14 at the Mayflower Hotel.

Details may be obtained by writing to the secretary, Otto W. Brandhorst, 4952 Maryland Avenue, St. Louis 8.

BOOKLET TELLS HOW TO APPLY FOR FOREIGN LECTURESHIPS

How institutions may obtain visiting lecturers, professors, and research fellows from foreign countries, and how individuals may apply for similar opportunities abroad, under the various grants-in-aid programs conducted by the State Department, is described in a new Government booklet released in May.

Under the U.S. Government educational exchange activities, this year nearly 10,000 persons are being exchanged between the United States and more than 60 foreign countries for study, teaching, lecturing, research, and other educational activities, the booklet states.

Department of State Publication 4198, which may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., describes opportunities provided by the Fulbright Act, the U.S. Information and Educational Exchange Act, the Finnish Educational Exchange Program, the Convention for the Promotion of Inter-

American Cultural Relations, the Specialized Programs for Germany aud Austria, the Iranian Trust Fund, the Chinese Emergency Aid Program, and the Point Four and ECA Programs.

CLINICAL ORAL PATHOLOGISTS INSTITUTE HOLD OPEN MEETING

The October meeting of the New York Institute of Clinical Oral Pathology, Inc., will be open to all members of the dental, medical and allied professions in celebration of its one-hundred-and-fiftieth monthly conference, it is announced by Theodor Blum, secretary.

Hans Selye, director of the Institute of Experimental Medicine and Surgery of the University of Montreal, will present an essay on the role of the general adaptation syndrome in oral pathology.

The meeting will be held at the New York Academy of Medicine, 2 East 103rd Street, New York, on October 29 at 8:30 P.M.

Details may be obtained by writing to Dr. Blum at The New York Institute of Clinical Oral Pathology, Inc., 101 East 79th Street, New York 21, N. Y.

THREE DENTAL PRODUCT FIRMS INVOLVED IN ANTITRUST SUIT

Three dental product firms are involved in a civil antitrust suit which charges conspiracy to monopolize the manufacture and sale of alginate dental impression powder. Defendants named in the suit, filed May 17 by the U.S. Department of Justice at the Federal District Court in Wilmington, Del., are the L. D. Caulk Co., of Milford, Del.; the Coe Laboratories, Inc., of Chicago; the Dental Perfection Co., of Glendale, Cal., and Stanley E. Noyes, president of the Dental Perfection Co.

In another Federal action, the Federal Trade Commission approved a stipulation in which Plasti-Liner Co., Inc., of Buffalo, agrees to stop representing that application of Brimm's Plasti-Liner "will accomplish permanent results in the refitting or tightening of dental plates or assure perfect fitting plates." The FTC explained that this action was taken "in accordance with the FTC policy of encouraging law observance through cooperation in certain types of cases where there has been no intent to defraud or mislead."

Armed Forces

NEW DRAFT BILL BECOMES LAW: MACHINERY PROVIDED FOR UNIVERSAL MILITARY SERVICE AND TRAINING SUPERVISED BY COMMISSION

The bill (S 1) extending Selective Service until July 1, 1955, was signed by President Truman on June 19. It sets the age of eligibility for the draft at 18½, but provides that the 18½ year age group cannot be drafted until draft boards have exhausted their pool of men between 19 and 26. It extends the service period from 21 to 24 months, and requires an additional six years' service in a Reserve component after its completion. Four months of basic training must be given before an inductee or a recruit is sent overseas.

Maximum combined strength of the Armed Forces is set at 5,000,000.

Deferments are left to the discretion of the President except for a provision that high school age students can be deferred to complete their courses or until they are 20 years of age. College students may be deferred to complete their academic year, but are allowed only one such deferment.

Naval dental officers from the United States Naval Training Center, Great Lakes, Ill., who presented table clinics at the Illinois state dental convention on May 10, in Peoria, were (l. to r.): Lt. Cmdr. E. Edward Dann; Lt. (j.g.) Robert Korte; Cmdr. Wm. E. Ludwick; Cmdr. Wm. R. Stanmeyer; Cmdr. Arthur A. Gilbert; Lt. (j.g.) Don M. Ball; and Cmdr. Wm. J. Charm. Subjects of the clinics were penicillin dentifrice in relation to lactobacillus counts, training of dental technicians, prosthetic technics for naval patients, full denture rebasing technics, ocular prosthesis, and naval periodontia.

The bill provides for machinery to be set up for a program of universal military training, which can be put into effect at a time when six months' service for men under 19 years of age is no longer considered necessary by the President or Congress. General supervision of training policies is given to a "National Security Training Commission," immediate creation of which is authorized in the bill. The commission is to be composed of three civilian members, one of whom is to be chairman, and two active or retired officers. Within four months after its creation, the commission is to submit to Congress its plans for the UMT program, after their approval by the Secretary of Defense. Forty-five days are then allowed for report by the Armed Service Committees of the Senate and the House. The bill requires that no inductions be made under the UMT program until Congress has approved a code of conduct for the trainees, and a plan for death benefits and disability payments.

A House amendment that would have exempted full-time Veterans Administration physicians and dentists over 30 years of age from the doctors' draft law was eliminated before the bill was passed. According to Rep. Carl Vinson, (D., Ga.), chairman, the House Committee eliminated it because of the Senate Committee's objections "on the ground that it was discriminatory and would have provided an exemption for one group (of physicians and dentists) in veterans' hospitals and would not protect the hundreds of civilian hospitals which likewise must be maintained and staffed throughout the Nation." The amendment had been introduced by Rep. Cleveland M. Bailey (D., W. Va.).

ARMY REQUESTS 15,000 INDUCTEES IN JULY

The Army has requested Selective Service for 15,000 inductees in July, the smallest number in any month since the start of the emergency. The call for August was fixed at 22,000.

RESERVE COMMISSIONS IN AIR FORCE AGAIN AVAILABLE

Vacancies are again available in Air Force commissioned grades for qualified dentists who desire Reserve commissions and extended active duty in the U.S. Air Force Dental Service, it was announced by Maj. Gen. George R. Kennebeck, Dental Division chief, on June 12.

Dentists receiving their degrees this year may be commissioned as first lieutenants. Dentists trained under the ASTP or V-12 program who do not have a commission with another service are also eligible for Air Force Reserve commissions, General Kennebeck stated.

Under the present policy, an officer is not ordered to active duty until approximately 75 days after he has taken his oath of office. Dentists requiring additional time may elect to enter at any time up to and through December 1951, it is announced.

Further information or application blanks may be obtained by writing to The Surgeon General, Headquarters, U.S. Air Force, Washington 25, D.C., Attention: AFCSG-25.1.

RESERVE DENTISTS RECALLED TO DUTY TOTAL OVER 3,000

A total of 3,240 Reserve dentists have been recalled by the three armed services since the outbreak of the Korean conflict, according to the Defense Department.

The Army has recalled 1,563 Reserve dentists, 1,175 of whom were in Priority I. In the Air Force, most of the 977 Reserve dentists who will have been recalled by June 30 this year are already on duty. In the Navy, about 700 Reserve dentists, a little more than half of whom are in Priority I, have been recalled, the Defense Department stated.

It is believed that the relatively low number of Priority I dentists recalled to the services is due to the lapse in time between the outbreak of the conflict and the effective date of the directive establishing priorities, as well as to the number of volunteers, according to Francis J. Garvey, executive secretary of the Committee on National Emergency Dental Services of the Association.

DENTAL REPORT FORM IS STANDARDIZED FOR SERVICES

Standardization of a single dental report form, for use by the three military departments effective August 1, has been announced by the Armed Forces Medical Policy of the Defense Department.

The form, which will replace three major forms and a number of lesser reports, is designed to present a clearer picture of the professional and administrative work load at each military, naval and air installation to which dental personnel are assigned. It will show the number of dental patients, the scope of examinations and treatment, and the number of professional administrative personnel assigned to the faculty. The form was evolved after a study directed by James P. Hollers of San Antonio, dental member of the Policy Council.

Standardized specifications for conducting dental examinations, and for dental classifications of individuals, are already in use by the three services.

LABOR DEPT. LISTS DENTISTRY AS A CRITICAL OCCUPATION

Dentistry is included in a Defense Manpower Administration list of critical occupations released by Maurice J. Tobin, Secretary of Labor, for use by the Defense Department and Selective Service in considering requests for delay in military service.

In a list of definitions of occupational titles, a dentist is defined as "a person of recognized education, experience, or legal qualifications engaged in the practice of

dentistry, or any phase of dentistry, such as extraction, filling, cleaning, or replacing teeth; treating diseased tissue of the gums and performing surgical operations on jaw or mouth. May specialize in one particular phase of dentistry, or in the caring for teeth of children, or in x-ray analysis."

Criteria used in determining critical occupations were an over-all shortage of personnel in the occupation which will ". . . significantly interfere with effective functioning" of the activity, "a minimum accelerated training time of two years (or the equivalent in work experience) . . ." and the indispensability of the occupation to the functioning of the activity, Secretary Tobin stated.

Professional nurses, osteopaths, physicians and surgeons also were listed, along with 54 other occupational titles.

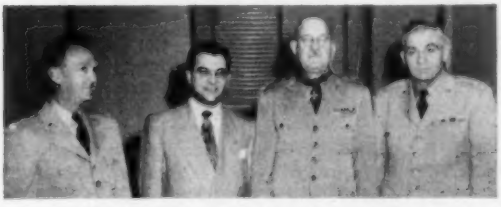
SHANDS, DELAWARE SURGEON, APPOINTED TO POLICY COUNCIL

The appointment of Albert Rives Shands, Jr., of Wilmington, Del., as a member of the Armed Forces Medical Policy Council effective July 1, was announced on May 31 by the Secretary of Defense, Gen. George C. Marshall. Dr. Shands will take the place on the Council made vacant by the appointment of W. Randolph Lovelace, II, of Albuquerque, N.M., as chairman of the Council to succeed Richard L. Meiling, who resigned.

Dr. Shands, an authority on orthopedic surgery, is medical director of the Nemours Foundation and surgeon in chief of the Alfred I. duPont Institute, Wilmington, Del., and has served as a civilian medical consultant to the Surgeons General of the three services. He is a visiting professor in orthopedic surgery at the University of Pennsylvania medical school. During World War II he served as a colonel in the U.S. Army Medical Corps and now holds that rank in the Organized Reserve Corps.

ARMY OFFERS DENTAL COURSES IN POSTGRADUATE PROGRAM

Two oral surgery courses are included in the Army's newly extended program of professional education recently announced by the Office of the Army Surgeon General. Both are available to civilian dentists when space is available. The courses will be held at Letterman Army Hospital, San Francisco, September 24-28, and at Walter Reed Army Hospital, November 5-9. Subjects to be reviewed are general surgical procedures, anesthesia in oral surgery, roentgenology, dental alveolar surgery, infected teeth, treatment of traumatic injuries of facial bones, acute infectious processes of the head and neck, antibiotics, cysts, tumors,



Maj. Gen. George Kennebeck, chief of the Dental Division, U.S. Air Force, is shown here (center right) after receiving the Cross First Class of the Meritorious War Service Order from the National Legion Greek-American War Veterans. On his right is Perry Voultsos, secretary general of the Greek-American veterans organization, who presented the medal. Others in the group are (l.) Lt. Col. Harry Zubkoff and (r.) Col. John K. Sitzman, of the Dental Division, Air Force Surgeon General's office.

The award, which is the highest honor accorded by the organization, was presented to General Kennebeck "in deep appreciation of the conspicuous services rendered to the Allied cause, intelligent work in guiding the dental office of the Air Force, and humanitarian pursuits toward the 'good neighbor' policy."

surgical corrections of deformities of the jaws, and tracheotomy and clinical records.

The Letterman course will be under the direction of Col. Marhl H. Welch, with a staff of instructors from that hospital and from the University of California College of Dentistry and the College of Physicians and Surgeons School of Dentistry, San Francisco. Attendance will be limited to personnel from the 4th, 5th and 6th Army areas.

The Walter Reed course will be under the direction of Col. Neal A. Harper, and attendance will be limited to personnel from 1st, 2nd and 3rd Army areas.

Eligible to attend are Regular, Reserve and National Guard Army and Air Force dental officers on active duty, and Reserve and National Guard dental officers not on active duty, as well as civilian physicians on a space available basis. First priority in acceptance will be given to dental officers of the Armed Forces on active duty, followed by those not on active duty and civilian dentists, in that order.

Applications from eligible dental officers on active duty must be forwarded through channels to: Office of the Surgeon General, Department of the Army, Attention: Personnel Division, Washington 25, D.C. Applications from Air Force dental officers should be forwarded through regular channels. Applications from all other eligible dental officers not on active duty are to be forwarded through channels to the commander of the installation offering the course. Civilian dentists are to apply to the commander of the installation offering the course.

TRUMAN NOMINATES SECURITY TRAINING COMMISSION MEMBERS

President Truman, on June 19, nominated five men to a National Security Training Commission, creation of which was authorized in the new draft bill (see p. 103). The Commission is to recommend a plan for universal military service and training, and is to supervise training policies when the program is approved.

The five nominees are Lt. Gen. Raymond S. McClain, Army controller, for a five year term; Admiral Thomas C. Kincaid (Ret.), World War II commander in the Pacific, for a four year term; James W. Wadsworth, former congressman from New York, for four years; William L. Clayton, former undersecretary of state, for two years; and Karl T. Compton, former president of Massachusetts Institute of Technology, for two years.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editors reserve the right to edit all communications to fit available space and require that all letters be signed. Signatures will be deleted before publication at the request of the author. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

THE DENTIST AND CANCER

The dentist's responsibility in the campaign against cancer is emphasized by your editorial and by the leading position given in the April issue of THE JOURNAL to the article "Cancer and the Dentist" by Leonard B. Goldman. An increasing awareness of the importance of early diagnosis and prompt referral for adequate treatment on the part of the dentist is of utmost importance if the mortality from cancer of the oral cavity is to be still further reduced. Dr. Goldman's emphasis on the importance of the biopsy as the definitive step in the diagnosis of cancer, is entirely correct. It is unfortunate, however, that he has advised the taking of biopsies by the general practitioner of dentistry, and in particular, that he has advocated the sponge biopsy technic and the aspiration biopsy technic without sufficiently stressing the shortcomings of these methods, particularly in inexperienced hands.

The sponge biopsy technic was developed as a substitute for the cell smear technic in the detection of cancer of the cervix of the uterus. Microscopic examination of a surgically removed biopsy specimen remains the standard diagnostic method by which these preliminary screening tests must be confirmed. False-positive and false-negative results are reported even in the hands of experienced workers.

The aspiration biopsy technic is significant only when the diagnosis is positive. The percentage of false-negatives is so high, particularly with inexperienced operators, that a negative biopsy should never be accepted as establishing the absence of neoplastic disease.

Dr. Goldman's suggestion that "if the histologic report is negative for malignancy and nonspecific for another disease, and if healing does not take place, another biopsy specimen should be taken. If the second report is negative, and the dentist is still uncertain of the diagnosis, the patient should be referred to his family physician" is open to question. If the final diagnosis proves to be carcinoma, much valuable time may have been lost and the patient's life jeopardized.

In most instances the general practitioner of dentistry would be well advised to explain to the patient the possible seriousness of a mouth lesion suspected of malignancy and to refer him immediately for diagnosis and treatment to a specialist in the treatment of cancer or to a cancer detection clinic. This should be done after consultation with the family physician and with his approval. In most instances the biopsy should be taken by an oncologist and the decision on the method of treatment should be made after the opinions of a surgeon and a radiologist are considered. A false sense of security given by a negative biopsy report may lead to delay and to greatly lessened possibilities of successful treatment.

Paul E. Boyle, D.M.D., Philadelphia

ELIMINATION OF HEAT

The statement of Charles A. Levinson in the February, 1951, JOURNAL on the use of mineral oil in cavity preparation to prevent heat caused by friction should be noted by all dentists. Heat so produced can and undoubtedly does cause the death of untold numbers of pulps. This is a matter of paramount importance to the dental profession and to the public whom it serves.

I feel sure that more pulps die from this cause than through irritation caused by filling materials which is usually held responsible. It amazes me that a method to prevent this occurrence has not been given more attention by the profession, especially when overheating in cavity preparation is so prevalent since the almost general use of local anesthetics to prevent pain, a greater part of which could be prevented solely by eliminating heat caused by friction.

While commending Dr. Levinson's effort in bringing this subject before the profession, I think that a better, more efficient and easier method is the use of a de Vilbiss spray bottle

which is held by the dentist's assistant. A rubber block mouth prop and saliva ejector are placed in the patient's mouth. The spray can be used in such a manner as to constantly keep the field of operation clear. This technic speeds up very considerably cavity preparation and other operative procedures on teeth and is much less tiring to the operator since he is not interrupted by any rinsing and spitting. The use of local anesthetics can be decreased at least 50 per cent, but what is of greatest importance is that the pulp is not dangerously overheated.

For over 30 years I used this technic and nonvital pulps were a very uncommon occurrence, because no bur, disk or stone was ever put on a tooth without the spray. I have been interested in suggested attachments of sprays to cutting burs and stones and used them myself over 30 years ago. I found that it was just another gadget for the operator to look after, so abandoned it in favor of the spray in the hands of the assistant. As a time saver it is number one.

P. Ray Newling, Adelaide, South Australia

ON COMBINED ANESTHESIA

In the March, 1951, issue of THE JOURNAL, an article, "Combined Anesthesia in Operative Dentistry" by Harold Sherman and Carl Oman (page 294, last paragraph of column 2) contains a gross misstatement of fact as an article of mine which appeared in 1949 will attest. To date I have, conservatively speaking, used this so-called new procedure in approximately 4,000 injections. It is used routinely in this office for all types of oral surgery very successfully. I might add I experienced no untoward complications. I have given clinics on this technic at various state and county meetings and instructed students in its use in a postgraduate course in oral surgery. There is no question that this combination has a place in dentistry. Unfortunately, it has not been publicized sufficiently. These authors, seemingly, were either uninformed or unfamiliar with what is going on on the west coast.

I mention this because several of our colleagues who have witnessed my clinics and are using the procedure have written or called to suggest that I bring this to your attention.

Please accept this in the spirit in which it is written because of the high esteem and regard we have for THE JOURNAL.

Allyn S. Abramson, D.D.S., Los Angeles

AIRBRASIVE TECHNIC DISCUSSED

I purchased an Airdent machine soon after taking the required course. It was not long before I realized that here was something of great advantage in the general practice of dentistry. Now we can prepare cavities, abutments, give a prophylaxis, and remove amalgam and porcelain fillings with so little discomfort to the patient that it gives the operator a great satisfaction. He can do these things without any fear or apprehension on the part of the patient.

The continued use of the Airdent machine will revolutionize the practice of dentistry. The use of the airbrasive technic has its limitations, but there are instances where it can be used to completion of the work. In Class I and V cavities, the entire cavity can be prepared without use of rotary or conventional type of drill. In Class II, III and IV cavities, it has limitations, but these limitations are dependent on the ability of the operator.

The technic involved is simple once the principle of the airbrasive method is understood. The advent of this machine brings dentistry a long way along the road to removing the fear and apprehension which has been associated with the practice of dentistry ever since its inception. By using this technic, the dentist can offer his patient a type of service that is comfortable and is certainly less strain on the dentist. I have been in general practice for over 25 years and can truthfully say that if the dentists who feel they can use this technic in their practice will do so, they will have more patients coming to their office without fear and trepidation.

I hope as time goes on more dentists will avail themselves of the opportunity to become acquainted with the technic and thereby pioneer in the new field that lies ahead in the use of the airbrasive technic.

Harold J. Roach, D.D.S., Detroit

Cases and Comments

REMOVAL OF THIRD MOLAR FROM ANTRUM: REPORT OF A CASE

By Ralph O. Christensen, D.D.S., clinical assistant professor of oral surgery, School of Dentistry, University of Minnesota, Minneapolis.

A 24 year old woman was referred to this office by her dentist on March 23, 1948, with the complaint of constant pain in the right maxillary sinus associated with a mucopurulent discharge from the nose. These symptoms had been present for about seven months.

HISTORY

The patient stated that she had had no trouble with her sinuses until eight months earlier when a dentist removed an aching upper right second molar. She stated that the dentist had difficulty in removing the tooth; he fractured the root portion and did considerable "digging." Following extraction, there had been considerable pain and discomfort. One week later the dentist curetted the socket, which alleviated the pain but was followed by a foul discharge into the mouth that lasted approximately two weeks. Since that time there had been pain in the sinus area, becoming progressively worse and associated with increased nasal discharge. This condition caused her to seek the advice of another dentist, who in turn referred the case to us. The patient stated that no roentgenograms were taken at any time.

CLINICAL EXAMINATION

Examination revealed a well developed, attractive white woman suffering from an acute right maxillary sinusitis. The mouth was in a good state of repair with no caries. The tissues were normal in appearance and contour. The upper right second molar and all the third molars were missing.

ROENTGENOGRAPHIC EXAMINATION

Intraoral roentgenograms (Fig. 1) of the right first and second molars revealed the third molar to be lying directly over the apices of the roots of the normal first molar.

Extraoral roentgenograms (Fig. 2) revealed an unerupted right upper third molar in a high transverse position at the base of the maxillary sinus. From this there appeared to arise a somewhat lobulated tumor mass which filled the greater portion of the right maxillary sinus and showed some indication of eroding through the anterolateral wall of the right maxillary sinus. The nasal cavity was apparently not invaded and the floor of the orbit was not involved.

The findings indicated the presence of a tumor arising from an anomalous dental structure, probably an odontoma. Some of the findings could be interpreted as calcification along the margins of the tumor, but the tumor could be entirely of soft tissue structure.

The roentgenologist concluded that there was a malposed, unerupted, right upper third molar at the base of the right maxillary sinus and an associated right maxillary sinus tumor; probably odontomatous in origin.

DIAGNOSIS

Tentative diagnosis had been that of an accidentally displaced third molar perforating the sinus during the instrumentation for the removal of the fractured roots of the second molar. However, consultation with the roentgenologist led to the impression that there was a true tumor and that it might have become infected during extraction of the second molar.

OPERATIVE TREATMENT

Exploration of the antrum through the canine fossa was decided upon and on March 24 the patient was admitted to the University of Minnesota Hospital and prepared for surgery.

Except for the sinus and dental pathosis, results of general physical examination were essentially negative.

Laboratory findings were as follows:

Urine: reaction, 5; serum globulin, 1.025; serum albumin, 1; no sugar; no red blood cells; 1 white cell; no casts. Hematology: hemoglobin, 14.6; erythrocytes, 4,500,000; leukocytes, 12,900; bleeding time, 3 minutes, 30 seconds; clotting time, 2 minutes, 30 seconds. Serologic reaction was negative.

On March 25, 1948, premedication with morphine sulfate (grains ¼) and atropine (grains 1/150) was administered, and one hour later, under pentothal sodium, curare, nitrous oxide and oxygen anesthesia by the

Fig. 1 • Intraoral roentgenogram of upper first molar area revealing displaced maxillary third molar

orotracheal route, the following procedure was carried out.

Using the Caldwell-Luc approach, a slightly curved incision was made starting at the mucobuccal fold in the right third molar area and extending to the mucobuccal fold over the cuspid. The flap thus outlined was then reflected upward, exposing the canine fossa. With osteotomes and rongeur forceps, a 2.0 x 5.0 cm. window was cut in the lateral wall of the sinus, with care being taken not to disturb the tumor mass. No good lines of cleavage were present; the mass varied in density and was bound down with fibrous attachments to the sinus wall.

Three sections of varying density from the anterior, middle and posterior portions of the mass were then excised and sent to the laboratory for frozen section examination. The mass was curetted from the sinus with considerable difficulty, and the third molar was lifted from its position on the antral floor.

Examination of both frozen and paraffin sections showed them to be composed of fibrous connective and scar tissue, chronically inflamed but not malignant.

For this reason, the lining membrane of the medial wall of the sinus was not removed. A nasoantral window was made below the inferior turbinate. Approximately one yard of one-inch vaseline gauze was introduced through this opening and lightly packed throughout the sinus. The incision in the mucous membranes of the oral cavity was then closed with interrupted 00 silk suture.

POSTOPERATIVE COURSE AND RESULTS

Postoperative course was uneventful except for a moderately severe swelling of the right cheek. On March 27, approximately 12 inches of the vaseline gauze drain was removed through the nose, and a similar amount each day until March 30, when the remaining gauze was removed entirely. There was considerable discharge through the nose during this period, but none through the wound. The patient was discharged from the hospital on March 30.

On April 2, the patient was seen in the office. The intraoral sutures were removed and the sinus was washed with saline through the nasal window. It was again washed with saline on April 4, 8 and 15, and the washings became progressively clearer. The patient reported cessation of nasal discharge between the last two visits. Since that time, there have been no complaints of discharge, pain, or complications.

Films were again made of the sinus regions (Fig. 3). The radiologist reported that evidence of a surgical procedure could be seen along the anterolateral wall of the right maxillary sinus, and that the unerupted molar at the base of the right maxillary sinus had now been removed. The lobulated density was again demonstrated, but it probably represented a sclerosing osteitis around the mass previously demonstrated in this region. However, it appeared to be of reduced density in its midportion, probably due to removal of the soft tissue material, and there was also less density overshadowing the lower portion of the right nasal cavity. It was considered probable that the residual density in this region would re-

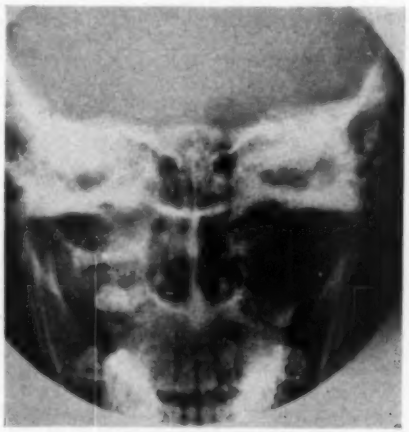


Fig. 2 • Extraoral roentgenogram of skull in the Waters sinus position revealing upper right third molar occupying maxillary sinus

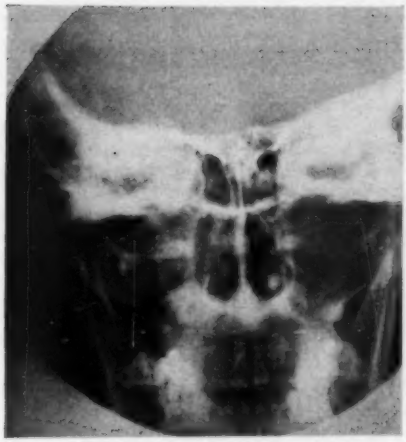


Fig. 3 • Postoperative extraoral roentgenogram of skull in Waters sinus position after removal of tooth in maxillary sinus shown in Figure 2, showing defect in lateral wall of maxillary sinus

main, and even become somewhat denser owing to new bone formation along the anterolateral wall of the involved sinus. The persistent findings, therefore, may be confusing in future examinations.

SUMMARY

There are two good lessons to be learned from this case, one for the general practitioner and the other for the specialist.

Because he failed to take roentgenograms preoperatively, the dentist whom the patient saw originally was unaware of the position of the third molar, which otherwise might not have been displaced. Secondly, by failure to take postoperative roentgenograms when the clinical symptoms pointed to the possibility of an antraoral fistula, that dentist failed also to disclose the damage he had wrought.

Our own diagnosis of the case was influenced by the roentgenographic findings and the fact that we did not suspect that the earlier dentist not only had committed a surgical error but, having made it, had failed to recognize it.

829 LaSalle Building

Book Reviews

VISUAL ANATOMY, HEAD AND NECK

By Sydney M. Friedman, M.D., Ph.D. 232 pages with 93 illustrations, 18 in color. Index. Price $6.50. Springfield, Ill., Charles C Thomas, 1950.

This volume on the anatomy of the head and neck is an innovation, and, may we add, a welcome innovation. In the preface the author says that his book "is not meant to compete with standard current texts and courses, nor is it meant to be an atlas, but rather it attempts to present briefly and forcefully that Anatomy which I feel is essential for the practice of Medicine." Emphasis is, of course, placed on the illustrations, the accompanying text is brief and to the point. The text always faces the corresponding figure and occupies at most one full page. The illustrations are executed in bold white lines and surfaces on a black background, probably an intentional similarity to blackboard drawings. Red, yellow and blue colors are used sparingly, but to good effect. The selection of illustrations, all drawn by the author himself, is, of course, to some degree subjective. Very probably every teacher of anatomy would like to see this or that picture added. But the choice of the author is, on the whole, excellent. As might be expected, not all the drawings are of the same quality. Some lack clarity or the third dimensional depth, especially Figures 58 to 62 and 77 on the skull and the dura mater, 85, 86 and 87 on the pharynx and larynx. Figure 3 does not give a clear picture of the cervical sympathetic trunk. The lack of a cranial continuation and the exaggerated size of the superior cervical ganglion are confusing. In Figures 48 and 49, details of the external pterygoid muscle, and in Figures 51 to 54 those of the masseter muscle, are not quite correct. The same must be said about the orbicularis oris muscle in these and the following illustrations (54-56). The anterior ethmoidal nerve and foramen are placed too far posteriorly in Figure 67, while the chorda tympani in Figure 75 arises from the facial nerve, running posteriorly instead of anteriorly. In Figure 70 the shape and relations of the uncinate process are not clear. Finally the pterygoid hamulus in Figures 26 to 31 cannot well be visualized. In the hope that this book will be issued in a new edition in the near future, these critical remarks are offered.

This reviewer believes that the courageous effort of the author has indeed produced a book in which, in his own words, "upper year and postgraduate students may find a rapid method for revising anatomy. . . ."

Harry Sicher

PLASTIC AND RECONSTRUCTIVE SURGERY —A MANUAL OF MANAGEMENT

By Ferris Smith, M.D. 895 pages with 592 illustrations. Index. Price $15. Philadelphia, W. B. Saunders Co., 1950.

The purpose of this manual, according to the author, is directive. It is not meant to teach the beginner in this special field except through a preceptor who has basic training, experience and competent judgment. The material is based on this noted surgeon's 35 years of experience in the field of plastic surgery. This volume adequately covers the entire field of plastic surgery including skin grafts, burns and general operative procedures. Separate chapters are devoted to treatment of defects of the scalp and cranium, face, orbit, ears, nose, facial bones, trunk and extremities. Because of the intimate association of oral surgery with many phases of plastic surgery, the dentist may be particularly interested in certain sections of this book. Chapter 2 deals with clefts and fractures of the face. The material on fractures of the jaws was written by Brig. Gen. Leigh C. Fairbank and Col. Roy A. Stout and is largely adapted from the *Military Manual of Plastic and Maxillofacial Surgery* published in 1942. No mention is made of the technics of open reduction and transosseous wiring or of the use of internal wire fixation which have recently been widely used in the treatment of jaw fractures. P. C. Lowry contributed a section on maxillofacial prosthesis in chapter 3 which again is largely adapted from the *Military Manual of Plastic and Maxillofacial Surgery*. Chapter 12 deals with functional and cosmetic disabilities of the facial bones. Case reports are presented to illustrate some of the common deformities and tumors of the jaws.

This manual may be recommended as supplemental reading for oral surgeons or others interested in expanding their knowledge of the over-all problems of plastic surgery. From a dental standpoint, however, the material is not complete or comprehensive enough to be of much value to the general practitioner or undergraduate.

Charles A. Waldron

PROTESE BUCO-MAXILO-FACIAL

By Mario Graziani. First edition. 585 pages with 450 illustrations. Index. Sao Paulo, Brazil, Livraria Vademecum Editora, Ltda., 1950.

Professor Graziani's book on bucco-maxillofacial prosthesis is written in Portuguese; the official language of Brazil. Although it is intended primarily for those who do surgery and prostheses in the head and neck region, it is so profusely illustrated that even to the general practitioner of dentistry it imparts much valuable information of general character. Although there are several books on this subject in the English language, this is a much needed volume in Portuguese.

The author gives a historical review of oral and facial prosthesis in its development in Brazil from 1919 to the present time. He discusses the general and local factors which enter into the examination of a patient requiring such a special prosthesis. Along with this is included a review of the anatomic landmarks and musculature of the mandible and cranium with numerous illustrations.

There is an interesting chapter on the analysis of facial esthetics, and on methods of photography. In logical sequence, Graziani discusses the several impression materials and accessory equipment which may be used, also the pouring and duplicating of models. He then goes into the technics for taking impressions of the face with plaster, wax and the hydrocolloids, followed by the construction of plaster face masks. He concludes the first portion of his book by discussing the materials which are available for making the prostheses, including gelatine, vulcanite, metals, celluloid, resins and latex. Unfortunately the author does not mention the most recent developments in this field of prosthesis in the United States, in which the polyvinyl resins have been used successfully.

The second portion of the book is devoted to the construction of prosthetic appliances by the use of latex and one of the earlier flexible resins. After discussing the treatment of postoperative palatal openings, Graziani reviews extensively the many types of clefts of the palate, together with the appliances suitable for each. This is followed by the subject of speech training, which is dealt with very briefly. Speech training is so important a phase of this work that it justifies a separate book by itself and its teaching lies in the field of the speech therapist rather than the dentist.

Many types of mandibular conditions and appliances are shown and technics given for their management. The author closes with a discussion of prostheses for restoring the nose, eye, ear, tongue and other types of somatoprostheses.

This book should serve a useful purpose for those interested in this service, particularly in Brazil and Portugal. It should also serve as a valuable library reference book in other countries.

Stanley D. Tylman

COMMUNITY HEALTH ORGANIZATION

By Ira V. Hiscock, Sc.D. Fourth edition. 278 pages. Price $2.75. New York: The Commonwealth Fund, 1950.

This is the fourth edition of a distinguished work originally published by the American Public Health Association in 1927 to make available the activities of the Committee on Administrative Practice in drafting plans for community health programs.

The city health department is the basic unit of direct personal service to the people. The author recognizes the infinite variations in the theory and practice of public health as a municipal function. He attempts, however, to develop an integrated program of health services required by a hypothetical community of 100,000 population in terms of personnel and budget. Salaries and costs are revised in relation to present dollar values.

This theoretical department comprises five basic operating units: (1) administration (health education, vital statistics, records and laboratories), (2) preventable disease control, (3) maternal and child health, (4) public health nursing and (5) environmental sanitation. This organization represents a consolidation of the seven administrative units outlined in the 1939 edition.

The author's deep understanding of the philosophy of modern health services is reflected in his treatment of cancer control, mental hygiene and nutrition as functions of the official health department. The chapter on medical care administration in relation to public health is an exceptionally clear statement of the role which the health department will play in the development of new patterns for the distribution of medical services to the general population.

Undoubtedly this work will continue to be a standard reference for the training of health personnel, a "handbook for the administrator and his staff" for program appraisal and lines of probable future development, and as a guide to the lay person concerned with health promotion.

Samuel Herman

PRINCIPLES OF ORTHODONTICS

By J. A. Salzmann, D.D.S. Second edition. 887 pages with 533 illustrations. Index. Price $15. Philadelphia, J. B. Lippincott Co., 1950.

To a great extent, this book is a compilation of abstracts of the literature related to orthodontics. The author's preface states that it "presents the various basic studies on which present day orthodontics has leaned heavily for its own progress." The 10 page "Index of Authors" lists the 1,100 persons whose writings are referred to throughout the text. References also are grouped conveniently at the end of each of the 21 chapters. These extensive bibliographies alone make the book valuable.

The variety of material in this publication is both impressive and perplexing. It is impressive because the reader can find summaries of innumerable procedures. The variety is exemplified in the following selection from the many topics: method of obtaining standing height, technic of using Wetzel's grid, method of exposure for carpal roentgenographs, cranial index, Pont's index, Bjork's method of diagnosing facial prognathism, anthropometric examination, face masks, roentgenograms of temporomandibular articulation, cephalostatic photography, latex rubber exercisers, exposing unerupted incisors and cuspids, tongue exercise, space retainers, lingual appliance, auxiliary springs, Angle edgewise arch appliance, ideal typal arch form, pinch bands, the headgear, Johnson twin-wire appliance, bite plates. The variety of material may be perplexing for the inexperienced reader because he must somehow evaluate the relative merits of the many different objectives and procedures if he is to use this book as a guide to diagnosis, prognosis and treatment. Another almost inevitable problem when many authors' views are presented is that of apparent contradictions. For example, most of the first 300 pages of the book are devoted to various aspects of growth, and yet, later in the book appear the words "it is practically impossible to predetermine the eventual course of growth and eruption."

Persons familiar with the first edition of this work will be interested in the changes found in the current revision. Principal areas of expansion are in the chapters on differential diagnosis and treatment planning, face and jaw anatomy, and growth and development. Less extensive changes and additional illustrations appear in the remaining chapters. These 852 text pages, the largest number yet to appear in English on orthodontics, are followed by 25 pages of a detailed subject index. The many references are of value to the student and teacher of the subject. The comprehensive index facilitates its use by the practitioner. This publication is a meritorious contribution to the literature of orthodontics.

Thomas D. Speidel

PSYCHOSOMATICS AND SUGGESTION THERAPY IN DENTISTRY

By Jacob Stolzenberg, D.D.S. First edition. 152 pages with 6 illustrations, 2 in color. Index. Price $3.75. New York, Philosophical Library, Inc., 1950.

This little book contains some valuable information told in an interesting manner regarding the subject indicated by its title. The author finds authority for his recommendations from his long experience and numerous contacts with physicians and dentists. He states in the preface that it is his intention to present, from the clinical and academic viewpoint, facts that are basic in developing a successful dental practice.

The text deals with the dynamics of psychosomatics relative to the dentist as well as the patients. The management of patients who are in emotional conflict and who have phobias regarding dental procedures is discussed. The use of therapy and suggestion is also discussed, including the use of hypnosis in dental practice. Interesting case reports illustrating difficulties of psychogenic origin are included.

The subject matter is divided into five chapters and is supplemented with an ample bibliography and index.

Where to begin and where to end is the problem of any writer who attempts to cover a subject as broad as the one which this author has chosen. Nevertheless, credit must be given for his earnest effort to help the dentist help himself. The material is presented in an interesting style, in language readily understood.

Not all readers may agree with the author's position. Some may dispute his precepts and premises, especially as related to hypnosis. The value of the book will depend on the attitude of the reader and his discernment of the practical suggestions and fundamental truth that can be applied to his own practice.

With so much emphasis being placed today on psychosomatics, this little volume is of especial interest to the dentist. The book, though brief, presents the material in a manner that will serve as a guide for those interested in the subject. It is replete with practical suggestions.

E. Alan Lieban

LEADERSHIP IN DENTISTRY-LABORATORY RELATIONS

Edited by Alfred J. Asgis, M.A., Ph.D., D.D.S. First edition. 187 pages. Index. Price $3.50. New York, Joint Dental Trade and Laboratory Relations Committee of the First, Second and Tenth District Dental Societies of the State of New York, 1950.

This interesting book contains original papers presented at the "First Workshop on Trends in Dentistry-Trade-Laboratory Relations" sponsored by the Dental Society of the State of New York.

As stated by the editor "the aim of this workshop was to focus attention on trends in dentistry-trade-laboratory relations and the most effective methods that have encouraged improvements in these relations and have aided in the solution of trade and laboratory economic, ethical and service quality problems in the interest of the people, the trade, the industry and the dental profession for the enrichment of dental culture."

Part I presents six chapters which are concerned with accreditation of laboratories and the improvement of dentistry-laboratory relations. The background, history and present status of accreditation are presented and reveal the broad and inclusive scope of this program.

Methods of strengthening the dental practice act to curb the illegal practice of dentistry are portrayed in a clarifying manner in Part II and the chapter entitled "Functions of the Dental Practice Act" is especially well presented and reflects the fact that the basic design of the law is to protect the public.

The problems of registration and licensure are discussed at great length in Part III. The chapter headed "The Professional Significance of the Connecticut Episode" portrays the vital need for a new and firm relationship between the dental profession and the laboratories. This chapter also points out the fact that, unfortunately, we "in the United States today have bold and reckless men whose political philosophy considers only what pays off at the ballot box."

Part IV entitled "Goals of Dentistry and the Laboratory Industries" emphasizes the importance of dental prosthesis as a special health service equal to other specialties of dentistry or medicine. The chapter "The Dentist's Responsibility in Oral Prosthesis" describes in an excellent and lucid manner the ethical responsibilities of the dentist to his patients and all mankind.

Methods, procedures and administrative aids are enumerated under "Appendices." The most interesting feature contained in this part is the writing of authorization or prescriptions.

One possible criticism might be that the ethical laboratories were not invited to participate in the deliberations of the first workshop. However, this is answered by the editor on page 67, footnote 1. He states "Representatives of the laboratories, the public, organized labor and other groups would be invited to later conferences. Consensus of dental opinion had to be established first."

Every dentist will find a wealth of vital data in this book and it will aid tremendously in providing a factual background for constructive thinking which may culminate in more harmonious relations between the dental profession and the dental laboratories.

Lloyd H. Dodd

DERMATOLOGY, AN ELEMENTARY REFERENCE FOR PHYSICIANS

By Harry Malcome Hedge, M.S., M.D., 80 pages with 39 illustrations. Printed and distributed by State of Illinois, Department of Public Health under the auspices of the Post-Graduate Committee, Illinois State Medical Society, 1950.

In this small manual Dr. Hedge attempts the difficult task of outlining for the practitioner in a few pages the signs, symptoms and therapy of the common skin diseases. His introductory paragraphs on history taking, examination and elementary dermatologic terminology accomplish this purpose admirably, and he renders a valuable service by stressing the important general principle of avoidance of overtreatment in dermatology. Because of the limitations on space, however, some of the subsequent sections on diagnosis and therapy are too sketchy to provide the practitioner with a really adequate guide. For instance, a potentially useful differential diagnostic classification is presented in which dermatoses are grouped according to the morphology of the lesions and the usual site of involvement. Because of the brevity of some of the morphological descriptions and the incompleteness of the regional classification much of the value of this table is lost.

In general the classification of dermatoses used in this handbook follows an orthodox pattern, but an exception occurs when the author groups under the heading "Itching Dermatoses" a number of conditions which are etiologically, pathologically and morphologically unrelated and in some of which the symptom of itching may be minimal or absent. It is doubtful whether this particular classification

serves a very useful purpose. Throughout the manual the sections on treatment are concise and practical. It is unfortunate that a number of relatively important developments in therapy such as the use of antihistaminics in urticaria, sulfapyridine in dermatitis herpetiformis, D.D.T. in parasitic infestations, and the newer antibiotics and fungicides when indicated, have been omitted entirely. The majority of illustrations are excellent.

Sheldon A. Walker

THE NATIONAL FORMULARY, 9TH EDITION

Prepared by the Committee on National Formulary under the supervision of the Council by authority of the American Pharmaceutical Association. 917 pages. Index. Price $8.00. Washington, D.C.: American Pharmaceutical Association, 1950.

The National Formulary and the *U. S. Pharmacopeia,* which are revised completely every five years, are legal standards for drugs. They include detailed chemical and pharmaceutical specifications for most of the drugs generally prescribed in this country. However, they do not include statements of actions and uses.

The 9th edition of the *National Formulary* became official on November 1, 1950. Among the articles new in this edition are camphorated parachlorophenol, potassium mercuric iodide, rutin, and thimerosal (Merthiolate®).

The following items were omitted from the new edition: compound acetylsalicylic acid paste, aconite and chloroform liniment, dichloramine T, iodine and zinc iodide glycerite (diluted Talbot's solution), phenolated iodine solution (Boulton's solution), papain, chlorinated paraffin, camphorated phenol and phenol glycerite.

The changes indicate a tendency to keep the *National Formulary* abreast of modern developments in materia medica, while at the same time it continues to serve its principal and very practical purpose as a guide for the pharmacist in the filling of prescriptions. *The National Formulary, 9th Edition,* should be in the library of every pharmacist and pharmaceutical chemist. However, the information given in the annual editions of *Accepted Dental Remedies* include the features of the *National Formulary* and *Pharmacopeia* which are essential to dentists, and also provide statements of actions and uses as well as much other helpful information concerning drugs of dental interest. Most dentists will therefore find *Accepted Dental Remedies* an adequate reference text for daily use. However, those dentists who wish to prepare mixtures containing drugs will find the official compendia very useful, if not indispensable.

Donald A. Wallace

SPEECH PROBLEMS OF CHILDREN

Edited by Wendell Johnson, Ph.D. 261 pages. Price $3.75. New York: Grune and Stratton, 1950.

This book was prepared for the National Society for Crippled Children and Adults by the American Speech and Hearing Association as an aid to parents and others concerned with school children affected by speech disorders. Written in language easily understandable to the layman the book contains chapters on the major speech defects, with each chapter written by a different authority. Chapters cover a broad survey of the problem, speech in the home and in the school, children who do not talk plainly and those slow in learning to speak, children with cleft lip and cleft palate, children with cerebral palsy, voice disorders, hesitant speech and impaired hearing. At least 3,500,000 school children need speech correction, according to the American Speech and Hearing Association, yet only about ten per cent of this large group receive the attention and training they need.

ENDODONTIA—THE CLINICAL PATHOLOGY AND TREATMENT OF THE DENTAL PULP AND PULPLESS TEETH

By Edgar D. Coolidge, M.S., D.D.S. Third edition. 300 pages with 355 illustrations and a colored plate. Index. Price $6. Philadelphia, Lea & Febiger, 1950.

The material in this book is a portion of a former textbook by the same author. This work was published under the title *Clinical Pathology and Treatment of the Dental Pulp and Periodontal Tissues.* It enjoyed two previous editions. The author, recognizing the need for separating these two subjects, has divided his work into individual textbooks under the titles *Endodontia* and *Periodontia.*

The first portion of the original book consisted of 11 chapters relating to clinical pathology and treatment of the dental pulp. In the new text, four chapters have been added. The author has elaborated on the subject matter and brought it up to date.

The new chapters are "Sulfonamide and Antibiotic Medication for Infected Root Canals," "Root Resection," "Focal Infection" (the material for this chapter was prepared by Maynard Hine, dean, University of

Indiana, School of Dentistry) and lastly a chapter on "Pulpless Teeth." Several new illustrations have been added.

The text as a whole is readily comprehended, scientific and dependable. The illustrations are excellent and some are practically noteworthy, because they represent original research done by the author. The book is recommended to undergraduate students as well as practitioners who have not had the advantage of modern concepts and technics in this field.

Dr. Coolidge is to be congratulated on giving us once more a valuable contribution to dental literature, and the publishers for presenting the text in such a good style.

E. Alan Lieban

AIDS TO PUBLIC HEALTH

By Llywelyn Roberts, M.D., M.R.C.P., D.P.H. Sixth edition. 304 pages. Appendix. Index. London, Bailliere, Tindall and Cox, 1950.

Aids to Public Health was first published in 1923. This edition consists of 17 chapters, each one of them dealing with a phase of public health. It has five appendixes which deal mainly with the National Insurance Act of 1946; recent legislation on milk; the Housing Act, 1949; the Prevention of Damage by Pests Act, 1949; and includes a list of books dealing with various aspect of public health. An index is also included.

This book is concise and compact and is of interest to the public health worker as well as to the general practitioner of dentistry. Of special benefit is the section on the National Insurance Act. It is recommended for both the student and the practitioner as a ready reference of public health in the British Isles.

Harry Strusser

VOLUNTARY PREPAYMENT MEDICAL CARE PLANS

Council on Medical Services. Revised edition. 137 pages. Chicago, American Medical Association, 1950.

This 137 page booklet is full of information on the voluntary prepayment medical care plans in the United States.

It is well organized and gives complete information regarding these plans under such special headings as organizations, governing body, medical society approval, area covered, type of contract, income limits, enrollment, benefits, exclusions, waiting periods, monthly premiums, Blue Cross relationship and change of employment.

This booklet describes not only the plans sponsored by the American Medical Association, but also those not approved by the local medical societies. It is interesting to note that one plan includes dental provisions and these provisions are limited to "extraction of teeth and treatment of acute gum trouble."

Part 7 gives a complete summary by states, number of individuals covered by the plans, types of plans, types of benefits and the very important "Standards of Acceptance of the A.M.A. for Medical Care Plans."

The book should be on the shelf of every practicing dentist, to be read and studied in order that the dental profession may profit from the experiences of our medical confreres.

Harry Strusser

A HISTORY OF BIOLOGY

By Charles Singer, M.D., Sc.D. Second edition. 579 pages with 194 illustrations. Index. Price $5. New York, Henry Schuman, 1950.

This is a revised, up-to-date, edition of a work originally published at Oxford in 1931. There has been no revision of the text previous to this second edition, with the exception of the correction of a few errors when it was printed in the United States under the title, *The Story of Living Things.* Both the British and American printings have been exhausted for some years.

This edition represents the culmination of many years of thorough investigative work. It has long been considered the standard history of biology. The work of such men as Aristotle, Leonardo, Harvey, Goethe, Pasteur and many others is analyzed and evaluated.

The field of this book is much too broad to be covered in a brief review. It is the history of biology told in understandable terms, by one of the world's most distinguished scientists. The book is divided into four major areas: Part 1 covers the older biology, part 2, the historical foundations of modern biology and part 3, the emergence of main themes of contemporary biology. The typography is clear and the illustrations, many of which are diagrammatic, are adequately labeled. There is an indexed bibliography of almost 450 references which enhances the book's value.

This can well be used as a reference work, and should be of great value to anyone interested in biology.

E. Alan Lieban

Current Literature

THE VALUE OF BITE ANALYSIS IN MODERN DENTISTRY ELIMINATING UNCERTAINTY AND LACK OF PLANNING IN THE TREATMENT OF HUMAN DENTITION

Gosta Lindblom. Brit. D.J. 89:87, August 18, 1950.

Radiological examination of the temporomandibular joints is important in the bite analyses of patients, so that prophylactic and corrective prosthetic measures may be accurately undertaken.

Radiographs are generally taken in three positions: (1) habitual centric, (2) rest position and (3) maximal opening position.

Determinations can be made from these radiological examinations as to the extent of opening necessary, as in a closed bite, to place the temporomandibular joints in a normal functioning position. Measurements at this degree of opening are transferred to articulated models and from this point corrective prosthetic procedures instituted. Three case histories with illustrations are presented.

Such a method of bite analysis offers a practical means of determining the correct centric position and a means of ascertaining the extent to which a bite can be raised.

A. S. Watson

PSYCHOSOMATIC SLEEP IN DENTISTRY

A preliminary report by John Bartley; Paul D. Higgins; William Kostelecky; H. A. McQuillan, and A. A. Papermaster. Brit. J. of Medical Hypnotism. 1:46, Summer, 1950.

Psychosomatic sleep is not new. It is as old as civilization itself. Egyptian writings of 3,000 years ago set forth procedures much the same as those used today. Mesmer brought hypnotism to the attention of western Europe in 1770. James Braid, a Scotch physician in England, studied Mesmer's theories in 1841. His work was so thorough that his technic of induction is still used today. It was he who coined the word hypnotism.

Hypnosis or psychosomatic sleep is defined by Cannon as the production of a psychic condition in which the faculty of receiving impressions by suggestion, and the power to act upon and carry out those suggestions is greatly increased. Psychosomatic sleep differs from normal sleep in many ways. For instance, respiration and heart action are the same as in the waking state; also the pettellar reflex (knee jerk) is the same as in the waking state.

The dental patient is particularly amenable to suggestions for relaxation and relief of pain during the dental operation, because he has such a dread and fear of the hypodermic needle and the dental drill. Once a patient has been trained to receive mentally induced anesthesia, a suggestion may be made so that at a given signal the patient will immediately enter the trance state and display a total insensibility to pain and no sound or noises will disturb him. Once anesthesia has been produced in a patient it may be localized in any part of the body.

To be successful the operator must have a background in the study of human psychology, as well as practice in a variety of induction technics. In some cases four or five induction sessions are necessary before a successful operation is possible. However, this is the exception rather than the rule.

The following operations have been successfully performed using psychosomatic sleep: all types of cavity preparations and filling; the taking of impressions for full and partial dentures; the establishment of correct vertical dimension and the establishment of correct maxillary mandibular relationships; the extraction of teeth and the setting of immediate dentures; maintenance of anesthesia of the mouth during the healing period; preparation and setting of fixed bridgework; the removal of impacted lower molars; the removal of vital pulps; endodontic treatment of root canals and apical curettage with control of hemorrhage and saliva.

The interest in psychosomatic sleep was aroused at a demonstration of hypnosis given in 1948 by Thomas O. Burgess, Professor of Psychology at Concordia College, Moorhead, Minn., at a district dental meeting in North Dakota. Since that time many other reports and demonstrations have been presented to groups of dentists throughout the Northwest.

A study group has now organized itself into a society called the American Society of Psychosomatic Dentistry, with the purpose of studying and promoting the study of psychosomatic sleep in dentistry.

The use of psychosomatic sleep has certain advantages—such as relief of fear and apprehension, relaxation of the facial muscles which makes it easier for the dentist to work, better cooperation, and less fatigue from keeping the mouth open—which cannot be obtained

by any drug now commonly used. In other words the period in the dental chair can be made a period of rest and relaxation for the patient so that he can leave the office feeling refreshed and rested.

Psychosomatic sleep is an interesting and fascinating study. It has a place in dentistry. It should be controlled and allowed only in the hands of men of science. The mysticism of psychosomatic sleep must be removed. Psychosomatic sleep should not be considered as a panacea in dentistry, but rather as a true science meriting research.

James W. Larson

A NEW APPROACH TO THE TREATMENT OF MANDIBULAR PROGNATHISM

Joseph K. Gold. Am. J. Orthodon. 35:893, December, 1949.

Etiology of mandibular prognathism is presented by quoting excerpts from the orthodontic literature and discussing them briefly.

Treatment suggested is based on the hypothesis that the majority of these cases are the result of forward positioning of the mandible. Hence, a headcap and chin cap are advocated to reposition the mandible posteriorly. No bands or archwires are placed on the mandibular teeth. The maxillary appliance consists of a Johnson twin wire arch without incisor bands, the maxillary anteriors being ligated to the arch wire. A bite plane and a biting exercise is likewise prescribed. Suggestions as to how to enlist the patient's cooperation are included.

Eight case reports embodying modifications of the general treatment plan required to meet specific conditions demonstrate the author's procedures. Accompanying illustrations consist mainly of intraoral and extraoral photographs.

T. D. Speidel

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A STUDY OF THE CORNIFICATION OF THE ORAL MUCOSA OF YOUNG MALE ADULTS

Samuel C. Miller, Alexander Soberman and S. Sigmund Stahl

A comparison of the degree of cornification in four sites of the oral mucosa of 50 healthy young men was made, using the Papanicolaou staining technic. The resulting figures show that a constant pattern of cornification exists in each of the sites. This constancy may be useful in providing a normal base line for the study of aberrations in cornification. The findings are in accord with previous histologic evidence.

GINGIVAL CHANGES IN DEFICIENCY STATES, PREGNANCY, AND LACTATION PERIOD

Vimla Sud

A comparison has been made of the gingival conditions of 248 Indian refugees who were grouped according to various stages of nutritional deficiency and including patients in pregnancy and postnatal states. Gross changes in the gingivae, including congestion, ulceration, hypertrophic gingivitis, and an increased tendency to hemorrhage, were most pronounced in the pregnant groups. Similar changes were also associated with malnourishment, and the worst form of gingival pathosis was found in women who were suffering from nutritional deficiencies during pregnancy. The existence of local factors such as calculus accentuated the effects of nutritional deficiencies on the development of gingivitis.

HISTOCHEMICAL STUDY ON ALKALINE PROSPHATASE IN NORMAL GINGIVAE, VARYING THE pH AND THE SUBSTRATE

Romulo Luis Cabrini and Fermin Alberto Carranza, Jr.

Alkaline phosphatase in normal gingivae was studied varying the pH and the substrate. With sodium glycerophosphate (pH 9.2) the enzymatic reaction appeared in the corium. It was more intensive in the region of the epithelial attachment. The ferment was distributed preferentially around the vessels and in the collagenous fibers. Below pH 7.2, the enzymatic activity weakens, but accompanying substantial variations in the distribution of the enzyme were not observed. With nucleic acid the enzymatic reaction appeared not only in the corium but also in the epithelium, especially in the generative cells. Hydrolysis of lecithin showed enzymatic activity only in the nuclei of the corium of the epithelial attachment.

ORAL MANIFESTATIONS OF IONIZING RADIATION. I. ORAL LESIONS AND EFFECT ON DEVELOPING TEETH OF SWINE EXPOSED TO 2000 K.V. TOTAL BODY X-RAY IRRADIATION

James A. English and John L. Tullis

Oral tissues, salivary glands, and developing teeth of 41 young swine were studied grossly and histologically to observe pathologic changes resulting from x-ray irradiation. Swine were selected from 120 animals which were exposed to 2,000 kv. total body irradiation in doses of about 250 to 800 roentgens in air. A hard-tissue sectioning machine was developed by making sections through undecalcified teeth and jaws. Gross changes in the oral mucosa consisted of petechial and ecchymatic hemorrhages in 49 per cent of the animals and ulceration in 9.8 per cent. Histologic study revealed irregular erosions of the mucosa in about 30 per cent of the animals and either petechial or massive hemorrhage around developing teeth of 70 per cent of the swine. Regional lymph nodes showed a high degree of sensitivity by exhibiting hemorrhage and depletion of lymphoid cells. Salivary glands were among the less sensitive tissues with regard to morphologic change; however, a definite decrease of basic staining granules was observed in acute stages of radiation sickness, with complete recovery in 30-day survivors. A characteristic hypoplasia of the enamel of developing molar teeth was observed among swine which received more than 400 r. Ameloblasts actively producing enamel matrix appeared to be sensitive to irradiation. Other portions of the teeth showed minimal effects.

SOME OBSERVATIONS ON DENTAL CARIES IN CENTRAL CHINA

D. Afonsky

A survey of 3,349 male and female Chinese students between the ages of 12 and 27 years showed that 71.6 per cent of them were DMF negative. Of the 95,830 permanent teeth examined 2.46 per cent were found to have been affected by caries, or an average of 0.7 of a tooth per person. Among those with caries, 39.2 per cent had only 1 DMF tooth per person, 30.0 per cent had 2 DMF teeth per person, and 13.0 per cent had 3 DMF teeth per person. Only 2.3 per cent of those examined had over 6 DMF teeth. Of all the

carious teeth 83.4 per cent had only one surface involved. The first and second molars accounted for 93.7 per cent of the DMF teeth (the first lower molars alone accounting for 45.7 per cent). Eighty-three per cent of the cavities in the lower first molars and 93.3 per cent of the cavities in the lower second molars occurred in the pits and fissures of the occlusal surfaces. Caries of the anterior teeth was extremely rare. A detailed dietary survey revealed that the diet was deficient in calories and many essential nutrients, especially animal proteins, calcium, vitamin A, riboflavin, and niacin. Up to 82 per cent of the calories were derived from carbohydrates, predominantly polished rice. Sugar consumption was very low. It appeared from this survey that the nutritionally deficient Oriental diet rich in carbohydrates (rice) does not predispose to caries.

BILATERAL SYMMETRY OF DENTAL CARIES

M. G. Wheatcroft, L. J. Gerende, C. A. Schlack, B. L. Taylor, V. J. Berzinskas and C. E. Mullins

Data obtained from two groups of white rats, from the same caries-susceptible strain, were statistically analyzed to determine whether there is a bilateral symmetry of caries incidence between pairs of grooves in the molar teeth. When the caries experience for each groove is summed up over all the individuals of a group, a high degree of association has been found between the bilaterally paired grooves of the molar teeth (an average of 75 per cent symmetry). In the individual case, however, the degree of symmetry is subject to great variation. An appreciable degree of asymmetry exists (an average of 25 per cent) which would materially affect any conclusions based on the hypothesis of perfect symmetry. A method is demonstrated by means of which it is possible to determine the degree of symmetry between bilaterally paired grooves. Bilateral quadrant differences between the maxillae and mandible were obscured by summation of total caries incidence without regard to groove position.

AN EVALUATION OF VARIOUS TECHNICS FOR REDUCING DECALCIFICATION OF ENAMEL. I. IN EXTRACTED, ERUPTED, NONCARIOUS THIRD MOLAR TEETH

Hubert B. Palmer, Susie Overstreet and Marilyn Sacks

Extracted, erupted, noncarious whole third molar teeth, representing 148 adults, were thoroughly cleaned and divided into 3 experimental groups and 1 control group. Teeth in the experimental groups were treated with test solutions for 35 minutes. All teeth were maintained in glucose-serum broth seeded with culture of *Lactobacillus acidophilus* oral strain 12 B at 37 degrees C. for 30 days. The technics for reducing decalcification of enamel *in vitro*, utilizing an acidulated fluoride solution or 2 per cent sodium fluoride solution, were 64 per cent more effective than Gottlieb's method, utilizing Zin-Ferro-Nitrate solutions. The effect of either an acidulated fluoride solution, a 2 per cent sodium fluoride solution, or the Zin-Ferro-Nitrate solution for reducing decalcification *in vitro* varied with individual teeth. Two or more extracted, erupted, untreated noncarious third molar teeth from the same individual exhibited differences in resistance to decalcification. Likewise, among individuals, untreated teeth showed wide variation in tooth resistance and susceptibility to decalcification.

THE ISOLATION, PROPAGATION AND ACTIVITY OF A VIRAL AGENT ASSOCIATED WITH DENTINAL DESTRUCTION

Naomi C. Turner, George E. Crowell and Howard Dexter

Dentinal decay was scooped out of necrotic lesions of the tooth. This material was ground with the aid of a dental mortar and pestle. Physiologic saline solution was added. The suspension was placed in a Seitz filter (0.2-0.3 microns) and suction applied. The filtrate was injected onto the chorio-allantoic membrane of a developing chick embryo. The point of injection was covered with dental wax and the developing embryo returned to the incubator. After 48 hours the egg was opened and allantoic fluid withdrawn for serial passage. Impression slides made from chorio-allantoic membrane showed inclusion bodies in one series from the seventh through the twenty-fifth passage. In other series the inclusion bodies appeared somewhat earlier. How well the organic matrix of the tooth may be expected to support viral growth remains largely for the future to determine.

NITROGEN AND PHOSPHORUS OF EARLY, SMOOTH-SURFACE CARIES OF ENAMEL

Thomas B. Coolidge

Nitrogen and phosphorus content of the material from early caries of the enamel were analyzed. The nitrogen and phosphorus content of sound enamel and of early carious material from the same tooth was compared. There is wide variation in individual samples even from the same tooth and no consistent

difference between normal enamel and that of early caries.

THE PRODUCTION OF ACIDS FROM GLUCOSE BY ORAL MICROORGANISMS: LACTIC AND PYRUVIC ACIDS

Isaac Newirth and William H. Summerson

This is a study of the production of acids from glucose in saliva (stimulated) as a medium by the use of chemical and micromanometric methods. The saliva was incubated with added glucose in the Warburg apparatus under physiologic conditions for 15 to 30 minute periods, using a differential manometer for the precise determination of the total acid produced, and improved chemical methods for the subsequent analytical study of the individual acids present. In most of the experiments, the lactic acid formed accounted for less than one half of the total acid production as measured manometrically. Some pyruvic acid was occasionally formed, but in the majority of experiments lactic and pyruvic acid production did not account for more than one half to two thirds of the total acid production. The nature of the remaining acid or acids is not known. In the mixed flora of the saliva, lactic and pyruvic acids are metabolized as well as produced. Hence, the net amount of acid present at any given time due to bacterial action on glucose represents a balance between rate of formation and rate of destruction. Consideration of the results with respect to the presence or absence of active caries in the subjects studied failed to reveal any influence of this disease on the quantities measured.

PENICILLIN RESISTANCE OF STREPTOCOCCI AND STAPHYLOCOCCI IN A PENICILLIN DENTIFRICE STUDY

Howard E. Lind and Helmut A. Zander

Throat swabs were taken from 190 children who had used a tooth powder containing 500 units of penicillin per gram for two years and 154 children who had used a tooth powder with no penicillin added for the same length of time, in order to study penicillin sensitivity of streptococci and staphylococci isolated from these throats. Alpha hemolytic streptococci as the predominating organism had an incidence of 40 per cent in the treated group and 39 per cent in the control group; pneumococci were found as the predominating organism in frequency of 38 per cent and 30 per cent respectively. Nonhemolytic *Staphylococcus aureus* and beta hemolytic streptococci comprised numbers three and four respectively in frequency. In both groups the sensitivity of organisms was well wtihin the range normally found for these organisms. The average sensitivity value was higher in the penicillin group than in the control group for streptococci while the reverse was true with the staphylococci which were isolated. Since the results were sufficiently comparable in both groups, it was concluded that penicillin did not induce an acquired resistance in the groups of streptococci and staphylococci isolated from the throats.

A STUDY OF STREPTOCOCCUS SALIVARIUS AND ITS RELATIONSHIP TO THE DENTAL CARIES PROCESS

Frederic R. Shiere, Carl E. Georgi and Ralph L. Ireland

The possible role of *Streptococcus salivarius* as one of the factors in the initiation of dental caries was investigated. A number of isolates were made from saliva specimens employing a sucrose medium which made identification easy because of the mucoid colonies which are formed. Growth of purified isolates in various carbohydrate broths confirmed the fact that the bacteria were typical *Str. salivarius*. This was further supported by evidence from stained preparations. Quantitatively, the occurrence of the organism in saliva was significant when correlated with the number of decayed, missing and filled teeth. Several of the isolates when inoculated into carbohydrate media containing sterile, freshly extracted teeth, produced a change in the tooth structure not unlike caries *in vivo*. Over a 48 hour period about 50 per cent of the sugar had been consumed by *Str. salivarius*, 0.5 per cent lactic acid was produced and a pH in the range 4.2 to 4.8 reached.

THE ACIDITY OF SALIVA AFTER INGESTION OF CARBOHYDRATE- AND ACID-CONTAINING SUBSTANCES

H. W. Haggard and Leon A. Greenberg

The effect of ingestion of carbohydrate-containing nonacid substances and of various acidulated beverages on the acidity of the saliva was studied in a group of human subjects. The pH of the saliva was determined at short intervals of time for a period of 90 minutes after ingestion. With the nonacid substances no significant acidity of the saliva occurred at any time. With the acidulated beverages the acidity of the saliva was not

high enough nor of sufficient duration to render corrosion of the teeth likely.

THE EFFECTS OF TEMPERATURE CHANGES ON SALIVARY AMYLASE ACTIVITY

Leon H. Schneyer

This investigation is concerned with delineating the effects of changes in temperature on the action of salivary amylase. Amylase activity was determined by Somogyi's iodine method.

Salivary amylase from mixed human saliva diluted finally 1:4000 with 0.25 per cent NaCl and at a pH of 6.8 showed an optimum activity of 50 degrees C. The increase in activity with a rise in temperature in the range below 50 degrees C. is due to the accelerating effect of temperature on the native amylase-starch reaction. The heat of activation of this process was determined to be 22,742 calories. The decrease in activity as the temperature is raised beyond the optimum is due to the ascendency of a denaturation reaction. The heat of activation of this process was determined to be 62,342 calories.

One stage of the heat denaturation is found to be reversible by cooling. The presence of substrate protects the enzyme against denaturation by altering the equilibrium between native and reversibly denatured enzyme in favor of the native form. NaCl effectively protects against the heat denaturation of salivary amylase.

THE VALIDITY OF HAMSTER STUDIES IN CARIES CONTROL

Helmut A. Zander, Vincent F. Lisanti and Frederic R. Shiere

Penicillin, aureomycin and tyrothricin were tested for their efficacy in reducing hamster caries. They were applied in various concentrations in dentifrice form by brushing hamster's teeth. Penicillin in concentrations of 500 units per gram of dentifrice reduced the incidence of hamster caries 93 per cent to 98 per cent. Aureomycin had less efficacy and tyrothricin was ineffective.

THE EFFECT OF COMPOSITION OF LIQUID AND POWDER ON THE PHYSICAL PROPERTIES OF SILICATE CEMENTS

R. S. Manley, C. F. Baker, P. N. Miller and F. E. Welch

A survey has been made of the possibilities of improving the properties of dental silicates by modification of the kind or amount of modifier in liquid and by varying the kind and amount of flux and the proportions of usual oxides in the powder. The suitability of various compositions was judged from determination of consistency, setting time, hardness, and water solubility. In some instances the acid solubility, the refractive index of the powder, and the opacity of the set cement were measured. Liquids were evaluated by mixing these with a commercially available powder, and powders were compared in most instances after forming cements with a commercial liquid.

When aluminum or zinc was used alone as a modifier, the physical properties of the cement were approximately the same as that prepared from a special control liquid and that prepared from a commercial liquid. Magnesium, indium, calcium, barium, titanium, and beryllium proved to be unsuitable as single modifiers in the liquid. Barium, calcium, and indium oxides could be used as comodifiers with zinc oxide without deleterious effect on the physical properties, but there was no indication of general improvement.

Only a very narrow range of composition containing CaO, SiO_2, and Al_2O_3 could be fused to clear glasses which would set within the proper length of time with silicate liquids. Several different compounds could be used as fluxes for increasing the range of compositions that would set. No composition was found which was appreciably superior in properties to representative commercial products and all powders tested were deficient in translucency.

Deaths

Akin, Hamilton L., Broadview, Ill.; Dental School, Northwestern University, 1919; died March 12; aged 55.

Allen, Edward H., Creso, Iowa; Chicago College of Dental Surgery, Loyola, 1903; died March 13; aged 76.

Amis, Charles B., Little Rock, Ark.; School of Dentistry, Vanderbilt University, 1914; died February 28; aged 65.

Annenberg, David M., Cincinnati; Cincinnati College of Dental Surgery, 1927; died March 25.

Ashley, Glenn A., Vancouver, Wash.; College of Dentistry, University of Minnesota, 1930; died in January; aged 45.

Atkinson, Woodford G., Canton, Ohio; Baltimore College of Dental Surgery, University of Maryland, 1899; died February 23; aged 80.

Atwood, Arthur L., Ludington, Mich.; College of Dentistry, University of Illinois, 1902; died September 7; aged 72.

Banks, Ralph G., Hobart, Ind.; School of Dentistry, Indiana University, 1925; died March 6; aged 56.

Bartunek, Paul A., Knoxville, Iowa; College of Dentistry, Creighton University, 1924; died March 26; aged 55.

Bauer, Joseph C., Hartford, Conn.; School of Dentistry, University of Pennsylvania, 1918; died April 16; aged 56.

Bayles, Pearley H., Flora, Ill.; School of Dentistry, St. Louis University, 1915; died March 22; aged 78.

Beatie, Paul M., Wichita, Kan.; Kansas City Western Dental College, 1925; died January 3; aged 51.

Beckwith-Ewell, Starr L., Wethersfield, Conn.; College of Dental and Oral Surgery, New York, 1912; died May 14; aged 60.

Beeby, James W., Huntsville, Ark.; School of Dentistry, University of Kansas City, 1945; died March 26; aged 33.

Behm, Louis J., Davenport, Iowa; Dental School, Northwestern University, 1901; died March 15; aged 78.

Beise, Henry C., Windom, Minn.; College of Dentistry, University of Minnesota, 1896; died April 6; aged 79.

Belzer, Max W., Bridgeport, Conn.; Baltimore College of Dental Surgery, University of Maryland, 1909; died April 2; aged 63.

Bender, Reinhardt, Totowa, N. J.; School of Dentistry, University of Pennsylvania, 1910; died April 11; aged 62.

Bickle, John C., Stanton, Va.; Baltimore College of Dental Surgery, University of Maryland, 1905; died March 26; aged 74.

Biltz, Charles A., Dayton, Ohio; died March 26.

Binzel, Helmuth P., Milwaukee; College of Dental Surgery, University of Michigan, 1899; died April 27; aged 73.

Bissell, Joseph H. F., Melrose, Mass.; Dental School, Harvard University, 1944; died March 18.

Blewett, Joseph, Reading, Pa.; School of Dentistry, University of Pennsylvania, 1914; died January 31; aged 66.

Bolm, Alexander G., St. Louis; School of Dentistry, Washington University, 1909; died April 21; aged 69.

Boone, Van Daniel, Denver; Colorado College of Dental Surgery, Denver, 1915; died March 26; aged 72.

Boos, George W., Wayzata, Minn.; College of Dentistry, University of Minnesota, 1927; died March 18; aged 46.

Bootes, Jesse B., Indianapolis; Central College of Dentistry, Indianapolis, 1902; died April 5; aged 86.

Boston, Francis O., Dayton, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1895; died April 9.

Bradbury, William J., Omaha; School of Dentistry, Indiana University, 1892; died April 23.

Bratt, Leonard A., Minneapolis; Chicago College of Dental Surgery, Loyola, 1925; died March 12; aged 50.

Brokaw, E. B., Findlay, Ohio; died March 14.

Brookman, Clarence M., Omaha; Lincoln Dental College, Cotner University, 1913; died April 22.

Brosseau, Benjamin L., Brooklyn; New York College of Dentistry, 1912; died April 15; aged 63.

Brown, Chester K., Roslindale, Mass.; Dental School, Tufts College, 1915; died February 19; aged 61.

Brumberger, Martin, Millburn, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1915; died April 5; aged 62.

Brunk, George L., Lima, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1908; died February 14; aged 69.

Bruskin, Lawrence T., New Brunswick, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1929; died April 17; aged 45.

Clifford, Lee F., DeWitt, Iowa; College of Dentistry, University of Iowa, 1921; died March 8; aged 52.

Clune, James G., New York; School of Dentistry, University of Pennsylvania, 1902; died April 1.

Cockburn, Ernest A., Eureka, Calif.; College of Dentistry, University of California, 1903; died March 7; aged 76.

Coggins, Charles W., Hudson, Mass.; died April 23.

Cole, James A., Leesburg, Fla.; Atlanta-Southern Dental College, 1900; died March 5; aged 80.

Connor, Bruce P., Roswell, N. M.; Indiana Dental College, 1907; died February 16; aged 68.

Cooper, Enoch S., Samson, Ala.; Atlanta Dental College, Atlanta, 1903; died March 15; aged 70.

Coppersmith, Anthony W., Stanberry, Mo.; Western Dental College, Kansas City, 1902; died March 17; aged 74.

Cornwell, Elbert H., Waukesha, Wis.; Chicago College of Dental Surgery, Loyola, 1899; died April 3; aged 82.

Crane, William S., Spartanburg, S. C.; Southern Dental College, Atlanta, 1913; died August 25.

Crawford, Thomas P., Minning, S. C.; School of Dentistry, Vanderbilt University, 1926; died March 31; aged 50.

Creasy, James I., Berwick, Pa.; Pennsylvania College of Dental Surgery, Philadelphia, 1895; died March 24.

Cronk, Benjamin B., Chicago; College of Dentistry, University of Illinois, 1907; died February 17.

Croscup, Homer C., Pasadena, Calif.; New York College of Dentistry, 1890; died December 26.

Damrel, Elmore G., Chicago; School of Dentistry, Vanderbilt University, 1925; died March 3; aged 61.

Daniels, George E., San Francisco; College of Physicians and Surgeons, 1899; died March 15; aged 82.

Darby, Frank W., Nogales, Ariz.; died March 19.

Darrah, Homer C., San Fernando, Calif.; School of Dentistry, Western Reserve University, 1900; died February 28.

Davenport, Harry W., Oak Park, Ill.; American College of Dental Surgery, Chicago, 1892; died January 6.

Dennis, Elias O., Zanesville, Ohio; College of Dentistry, Ohio Medical University, 1900; died April 15.

Detrick, Arch M., DeLand, Fla.; Kansas City Dental College, 1891; died March 15; aged 83.

Dickinson, John W., Alstead, N. H.; Dental School, Harvard University, 1901; died March 29.

Dierks, George W., Toledo, Ohio; College of Dentistry, University of Illinois, 1915; died April 21; aged 64.

Dillard, Charles G., Huntsville, Ala.; School of Dentistry, Vanderbilt University, 1907; died in March.

Donnan, Harry L., Council Bluffs, Iowa; College of Dentistry, University of Iowa, 1922; died March 22; aged 51.

Doyle, Elmer O., Warroad, Minn.; College of Dentistry, University of Minnesota, 1916; died March 5.

Drake, Joseph A., Bolivar, Mo.; Kansas City Dental College, 1905; died April 6; aged 71.

Durant, F. Chester, Boston; Dental School, Harvard University, 1915; died March 7; aged 58.

Enstine, Ralph F., Holly, Mich.; College of Dental Surgery, University of Michigan, 1915; died March 10.

Erickson, Roger S., Tacoma, Wash.; School of Dentistry, North Pacific College of Oregon, 1925; died April 9; aged 50.

Ettington, Charles H., Highland Park, Ill.; Chicago College of Dental Surgery, Loyola, 1909; died January 15; aged 72.

Ewing, Leonard C., Milwaukee; Dental School, Marquette University, 1924; died March 15; aged 52.

Farris, Hugh A., Hemingway, S. C.; died March 7.

Fellers, Elbert W., Beatrice, Neb.; College of Dentistry, University of Nebraska, 1906; died February 27; aged 69.

Fernald, John A., Providence, R. I.; Dental School, Harvard University, 1917; died April 25; aged 62.

Ferner, Christopher S., Tulsa, Okla.; College of Dental and Oral Surgery, New York, 1893; died April 3; aged 87.

Fickes, William L., Pittsburgh; School of Dentistry, Temple University, 1891; died March 30.

Fitzgerald, Edward V., Mondovi, Wis.; Dental School, Marquette University, 1918; died March 17; aged 57.

Flamm, Louis F., Muskogee, Okla.; died February 22; aged 87.

Hassell, Henry C., Tuscaloosa, Ala.; Louisville College of Dentistry, 1898; died August 14; aged 78.

Matthews, William H., Anderson, Ind.; Central College of Dentistry, Indianapolis, 1898; died December 17; aged 78.

McLaughlin, Frederick H., San Diego, Calif.; Philadelphia Dental College, 1897; died January 5; aged 74.

Miller, Carl B., Des Moines, Iowa; College of Dentistry, State University of Iowa, 1892; died January 4.

Misner, Elroy R., Henderson, Neb.; College of Dentistry, Creighton University, 1927; died December 26; aged 49.

Moynihan, Francis W., Philadelphia; School of Dentistry, University of Pennsylvania, 1918; died January 10.

Mullen, Adam W., Philadelphia: Philadelphia Dental College, 1907; died February 20.

Mulvihill, Harold J., Oak Park, Ill.; Dental School, Northwestern University, 1927; died December 14; aged 47.

Murphy, Lawrence B., McHenry, Ill.; College of Dentistry, University of Illinois, 1907; died in February.

Nasanow, David L., Mt. Vernon, N. Y.; New York College of Dentistry, 1925; died January 16; aged 54.

Nowinski, Stanley T., Penn Wynne, Pa.; School of Dentistry, Temple University, 1949; died February 25; aged 26.

O'Keefe, Emmet M., Des Moines, Iowa; Chicago College of Dental Surgery, Loyola, 1899; died January 25.

Olson, Edwin, Kenyon, Minn.; College of Dentistry, University of Minnesota, 1927; died January 16; aged 57.

Osmun, Albert B., Morristown, N. J.; New York College of Dentistry, 1888; died January 20; aged 85.

Pankey, Anna Mae, Virginia City, Mont.; School of Dentistry, North Pacific College of Oregon, 1914; died January 5; aged 75.

Parker, Ernest C., Auburn, Me.; Dental School, Tufts College, 1923; died January 23; aged 65.

Parks, George T., Sioux City, Iowa; College of Dentistry, University of Iowa; 1928; died January 22; aged 48.

Payne, Charles B., Charleston, W. Va., College of Dentistry, Howard University, 1920; died January 8.

Poutre, Edward I., Claflin, Kan.; Kansas City Dental College, 1912; died January 15; aged 72.

Powers, Nicholas C., Saratoga Springs, N. Y.; School of Dentistry, University of Buffalo, 1900; died January 11; aged 76.

Pratt, Charles B., Madison, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1913; died February 8; aged 61.

Prentiss, Charles C., Hartford, Conn.; died March 16; aged 82.

Purl, Henry B., Tujunga, Calif.; Western Dental College, Kansas City, 1896; died January 24; aged 91.

Reed, James S., Spokane; American College of Dental Surgery, Chicago, 1895; died January 23.

Reid, Samuel Q., Laguna Beach, Calif.; died January 27.

Rinker, G. C., Hamilton, Kan.; Kansas City Western Dental College, 1923; died November 12.

Robertson, Thomas M., Coffeyville, Kan.; Kansas City Dental College, 1900; died January 6; aged 77.

Robinson, Frederick W., Sioux City, Iowa; Western Dental College, Kansas City, 1900; died January 9; aged 76.

Robison, Fred S., Pittsburg, Kan.; Western Dental College, Kansas City, 1898; died December 31; aged 74.

Ross, Robert S., Oklahoma City; died January 7, aged 63.

Russell, George M., Memphis, Tenn.; School of Dentistry, Vanderbilt University, 1924; died February 7; aged 52.

Saavedra, Henry, Chicago; Chicago College of Dental Surgery, Loyola, 1914; died December 4; aged 71.

Santa Cruz, M. A., Pulaski, Va.; College of Dentistry, Howard University, 1927; died February 6; aged 53.

Schatz, Frederick W., Grand Rapids, Mich.; Chicago College of Dental Surgery, Loyola, 1905; died January 15; aged 74.

Schenck, Pearl A., Cass City, Mich.; College of Dental Surgery, University of Michigan, 1901; died February 15; aged 74.

Searcy, Battle S., Tuscaloosa, Ala.; Baltimore College of Dental Surgery, University of Maryland, 1900; died January 11.

Smith, Frank S., Seattle; died February 14; aged 83.

Soule, Chester H., Waterloo, N. Y.; School of Dentistry, University of Buffalo, 1924; died February 14; aged 50.

Sparks, Corey W., Detroit; died November 26.

Steele, David D., Bremerton, Wash.; died February 1.

Stein, Samuel, Brooklyn; Baltimore College of Dental Surgery, University of Maryland, 1908; died December 14; aged 76.

Steinman, Robert O., Jerseyville, Ill.; School of Dentistry, Washington University, 1905; died December 14; aged 68.

Stephens, Francis E., East Chicago, Ind.; Indiana Dental College, 1903; died December 5; aged 70.

Stewart, Howard T., Montgomery, Ala.; School of Dentistry, University of Pennsylvania, 1890; died January 18; aged 82.

Stockberger, Vernon C., Milford, Ind.; Indiana Dental College, Indianapolis, 1905; died January 5; aged 66.

Stollmack, David J., Brooklyn; New York College of Dentistry, 1922; died December 16; aged 50.

Stone, John T., Petaluma, Calif.; died February 2.

Strickler, Lee F., Paterson, N. J.; Dental School, Harvard University, 1913; died December 26; aged 59.

Sullivan, William C., Kaukauna, Wis.; Dental Dept., Milwaukee Medical College, 1902; died January 17; aged 73.

Sussman, Aaron P., New Rochelle, N. Y.; College of Dental and Oral Surgery, New York, 1906; deid February 24; aged 71.

Swanson, Ernest C., Atlanta, Ga.; Atlanta Dental College, died January 26; aged 64.

Swords, Collins W., Miami, Fla.; Dental School, Northwestern University, 1912; died December 10; aged 58.

Sykora, Rudolph, Boston; Dental School, Harvard University, 1902; died in November; aged 75.

Tate, Charles O., White Sulphur Springs, W. Va.; died February 16.

Tate, George H., Tutwiler, Miss.; Atlanta Dental College, 1897; died January 2; aged 78.

Tay, Carl D., Chicago; College of Dentistry, University of Illinois, 1912; died January 11; aged 71.

Thomas, Louis P., St. Louis; School of Dentistry, Washington University, 1910; died January 21; aged 71.

Thomas, Raymond W., Conneaut, Ohio; College of Dental Surgery, University of Michigan, 1908; died January 9; aged 72.

Thompson, Edward V. M., Bellefontaine, Ohio; Ohio College of Dental Surgery, University of Michigan, 1905; died February 9; aged 77.

Tilford, Elonzo D., Morganfield, Ky.; School of Dentistry, Vanderbilt University, 1899; died December 28; aged 84.

Tishler, Benjamin, Boston; Dental School, Harvard University, 1904; died January 3; aged 79.

Tison, Thomas P., Moultrie, Ga.; Atlanta College of Physicians and Surgeons, 1899; died December 6; aged 80.

Tompkins, Henry H., Utica, N. Y.; Philadelphia Dental College, 1891; died February 1; aged 88.

Toups, Ashton D., Baton Rouge, La.; School of Dentistry, Tulane University, 1915; died January 23.

Traband, Albert W., Philadelphia; Pennsylvania College of Dental Surgery, 1907; died December 16.

Tracy, Frank W., Blue Island, Ill.; Dental School, Northwestern University, 1904; died March 10; aged 72.

Turnamian, Carneg P., North Bergen, N. J.; School of Dentistry, University of Pennsylvania, 1928; died February 8; aged 48.

Ufberg, David D., Shamokin, Pa.; School of Dentistry, Temple University, 1936; died January 13; aged 40.

Walker, Edwin L., Newark, N. J.; New York College of Dentistry, 1904; died January 11; aged 68.

Ward, George N., Walden, N. Y.; Baltimore College of Dental Surgery, University of Maryland, 1895; died January 9; aged 82.

Ward, Nelson O., Bellefontaine, Ohio; College of Dentistry, Ohio State University, 1947; died January 4; aged 43.

Watson, Alfred P., Portland, Ore.; School of Dentistry, North Pacific College of Oregon, 1901; died December 13; aged 74.

Watson, Charles H., Denver; School of Dentistry, University of Denver, 1912; died December 30; aged 61.

Weber, Raymond J., Oconomowoc, Wis., Dental School Marquette University, 1925; died March 1; aged 51.

Weidenbach, Ernest F., Aberdeen, S. D.; College of Dentistry, University of Iowa, 1922; died December 24; aged 52.

Weinberg, Abe, Roanoke, Va.; Baltimore College of Dental Surgery, University of Maryland, 1896; died December 29; aged 75.

Wengenroth, William F., New York; died February 2; aged 73.

Weston, May, Kansas City, Mo.; School of Dentistry, University of Michigan, 1892; died January 21.

White, Earle S., Portland, Ore.; School of Dentistry, North Pacific College of Oregon, 1926; died January 23.

White, Leroy M., Smyrna, Ga.; Baltimore College of Dental Surgery, University of Maryland, 1899; died February 8; aged 74.

Wicks, Dwight B., Johnstown, Pa.; School of Dentistry, University of Pittsburgh, 1922; died January 18; aged 52.

Wilkins, George W., Trenton, N. J.; Medico-Chirurgical College of Philadelphia, 1907; died December 14; aged 70.

Willett, Raymond C., Peoria, Ill.; School of Dentistry, Washington University, 1899; died December 23; aged 73.

Wiltz, Otto P., Peoria, Ill.; Chicago College of Dental Surgery, Loyola, 1905; died December 11; aged 73.

Wipper, Arthur E., Cincinnati; Dental Department, Cincinnati College of Medicine and Surgery, 1900; died January 16.

Wittet, Gordon E., Detroit; College of Dental Surgery, University of Michigan, 1914; died February 7; aged 61.

Ziegler, Horace A., Moline, Ill.; Dental School, Northwestern University, 1902; died December 9; aged 78.

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Announcements

AMERICAN DENTAL ASSOCIATION

Ninety-Second Annual Session	Oct. 15-18, 1951	Washington, D. C.
Ninety-Third Annual Session	Sept. 8-11, 1952	St. Louis
Ninety-Fourth Annual Session	Sept. 28-Oct. 1, 1953	Cleveland

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 14, 15, 1952	Birmingham	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Alaska	Aug. 14-16	Juneau	J. Geyer	Box 915, Juneau
Arizona		Phoenix	E. M. Scott	1017 Professional Bldg., Phoenix
Arkansas		Little Rock	D. M. Hamm	White Bldg., Clarksville
California	Apr. 21-23, 1952	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California			C. A. Moss	1401 S. Hope St., Los Angeles
Colorado	Sept. 30-Oct. 3	Colorado Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut	May, 1952	Bridgeport	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware	Jan. 1952		S. J. Krygier	309 S. State St., Dover
District of Columbia	Mar. 9-12, 1952	Washington	K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	Apr. 20-23, 1952	Jacksonville	T. A. Price	808 Congress Bldg., Miam
Georgia	Sept. 23-26	Atlanta	J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii	Sept. 27-29	Hilo	J. H. Dawe	810 N. Vineyard St., Honolulu 17
Idaho	Sept. 27-29	Lewiston	H. M. Klaaren	Breier Bldg., Lewiston
Illinois	May 18-21, 1952	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 12-14, 1952	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 5-7, 1952	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 4-7, 1952	Topeka	F. A. Richmond	Brotherhood Bldg., Kansas City
Kentucky	Mar. 31-Apr. 2, 1952	Louisville	A. B. Coxwell	1976 Douglas Blvd., Louisville
Louisiana	Apr. 17-19, 1952	Shreveport	J. S. Bernhard	407 Medical Art Bldg., Shreveport
Maine			F. P. Gilley	31 Central St., Bangor
Maryland	May 4-7, 1952	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore 1
Massachusetts		Boston	H. E. Tingley	12 Bay State Road, Boston
Michigan	Apr. 21-23, 1952	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Feb. 18-20, 1952	St. Paul	C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi			H. M. Campbell	428 Gloster St., Tupelo
Missouri			R. R. Rhoades	201 Merchants Bank Bldg., Jefferson City
Montana	May 1-3, 1952	Butte	C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska			F. A. Pierson	Federal Security Bldg., Lincoln
Nevada			W. R. Bell	Medical Arts Bldg., Reno
New Hampshire			F. E. Williams	814 Elm St., Manchester
New Jersey			J. G. Carr	407 Cooper St., Camden
New Mexico			J. S. Ellar	Suite 7, Medical Arts Square, Albuquerque
New York	May 12-15, 1952	Syracuse	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina			B. N. Walker	Liberty Life Bldg., Charlotte
North Dakota		Minot	J. H. Lunday	302 Black Bldg., Fargo
Ohio	Nov. 25-28	Cleveland	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20-23, 1952	Oklahoma City	R. C. Calkin	Calkin Bldg., Guthrie
Oregon	Mar. 3-5; 1952	Portland	H. C. Fixott, Jr.	308 Selling Bldg., Portland
Panama Canal Zone	Dec.	Balboa	O. Slavin	Box 415, Balboa
Pennsylvania	Sept. 11-14	Pittsburgh	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Jan. 1952	San Juan	R. Carrasquillo	Box 214, Rio Piedras
Rhode Island	Jan. 1952	Providence	M. L. Biderman	144 Westminster St., Providence
South Carolina		Greenville	J. R. Owings	7 Medical Court, Greenville
South Dakota	May 18-20, 1952	Mitchell	E. W. Elmen	Sioux Falls
Tennessee		Memphis	W. L. McCulley	Brown Bldg., Cleveland
Texas	Apr. 28-May 1, 1952	Fort Worth	W. Ogle	3607 Gaston Ave., Dallas
Utah			E. O. Thompson	915 Medical Arts Bldg., Salt Lake City

State	Date	Place	Secretary	Address
Vermont			J. A. Larrow	Middlebury
Virginia	Apr. 28-30, 1952	Virginia Beach	J. E. John	804 Medical Arts Bldg., Roanoke
Washington			C. R. Flood	1130 Medical-Dental Bldg., Seattle
West Virginia	July 16-18	White Sulphur Springs	A. B. Drake	308 West Virginia Bldg., Huntington 1
Wisconsin	Apr. 14-17, 1952	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming			T. J. Drew	State Capitol, Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama			M. D. Edwards	120 Adams, Montgomery
Alaska	Aug. 6-11	Ketchikan	J. H. Geyer	Juneau
Arizona	Aug. 15-18	Florence	R. K. Trueblood	25 N. Second Av., Glendale
Arkansas			H. O. Weatherly	205 Halter Bldg., Conway
California	July 23	San Francisco	K. I. Nesbitt	507 Polk St., San Francisco 2
Colorado			W. D. McCarthy	724 Republic Bldg., Denver 2
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. M. Falls	1801 Eye St., N. W., Washington 6
Florida	July 9-14*	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			S. H. Yarbrough	Medical Arts Bldg., Columbus
Hawaii	Aug.	Honolulu	H. L. Houvener	7-8 Pantheon Bldg., Honolulu
Idaho	Aug. 7	Boise	W. K. Adams	718 Arthur St., Caldwell
Illinois	Nov. 6-9*	Chicago	W. A. McKee	503 Wood Bldg., Benton
Indiana			C. A. Frech	504 Broadway, Gary
Iowa			H. M. Willits	719 Roshek Bldg., Dubuque
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky			R. I. Todd	Western Union Bldg., Richmond
Louisiana			A. R. deNux	Markaville
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland			W. D. Day	3811 Hadley Square E., Baltimore 18
Massachusetts			J. C. Wilson	33 State House, Boston
Michigan			J. L. Champagne	3714 W. McNichols Road, Detroit 21
Minnesota			F. A. Larson	1632 Washington St., N.E., Minneapolis
Mississippi			J. C. Boswell	508 Lamar Bldg., Jackson
Missouri			R. R. Rhoades	Central Trust Bldg., Jefferson City
Montana	July 9-13	Helena	P. M. Feda	Box 865, Helena
Nebraska			C. A. Bumstead	924 Stuart Bldg., Lincoln
Nevada			G. C. Steinmiller	Masonic Temple, Reno
New Hampshire			J. B. Brown	5 N. State St., Concord
New Jersey			W. A. Wilson	150 E. State St., Trenton 8
New Mexico	July 2-5*	Santa Fe	J. J. Clarke, Sr.	Artesia
New York			D. W. Beier	23 S. Pearl St., Albany 7
North Carolina			F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota	July 9-12	Fargo	A. B. Crabtree	Ellendale
Ohio			E. D. Lowry	79 E. State St., Columbus
Oklahoma			J. B. Cole, Jr.	706 Asp, Norman
Oregon			A. F. Davis	306 Public Service Bldg. Portland
Pennsylvania			R. E. V. Miller	Northampton National Bank Bldg., Easton
Puerto Rico		Santurce	L. C. Coll	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			E. G. Bumgardner	1517 Hampton St., Columbia
South Dakota			K. A. Stormo	Lead
Tennessee			F. S. Maxey	804 Bennie Dillon Bldg., Nashville 3
Texas			R. T. Weber	312 Capital National Bank Bldg., Austin
Utah	July 16-21	Salt Lake City	J. J. Dalpias	Helper
Vermont			F. A. Reid	Windsor
Virginia			J. M. Hughes	715 Medical Arts Bldg., Richmond 19
Washington			J. B. Kiefer, Jr.	510 Cobb Bldg., Seattle
West Virginia			C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin			S. F. Donovan	Tomah
Wyoming			W. J. Ryan	208 Boyd Bldg., Cheyenne

*Dentistry and dental hygiene.

OTHER MEETINGS

Name	Date	City	Secy. or Chm.	Address
American Association of Dental Examiners	Oct. 12, 13	Washington D. C.	C. A. Bumstead Secy.	924 Stuart Bldg., Lincoln, Neb.
American Dental Assistants Association	Oct. 15-18	Washington, D. C.	M. L. Martin Exec. Secy.	410 First National Bank Bldg., LaPorte, Ind.
American Dental Society of Europe	Aug. 1-4	Lausanne, Switzerland	F. D. Derrick Secy.	140 Park Lane, London, W.1., England
American Denture Society	Oct. 13, 14	Washington, D. C.	A. L. Roberts Secy.	Aurora National Bank Bldg., Aurora, Ill.
American Public Health Association	Oct. 29-Nov. 2	San Francisco	R. M. Atwater Exec. Secy.	1790 Broadway, New York 19
American Society for the Advancement of General Anesthesia in Dentistry	Oct. 22	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York
American Society of Dentistry for Children	Oct. 12-14	Washington, D. C.	M. Kelner Program Chm.	1930 Chestnut St., Philadelphia 3
Asociacion Odontologica Argentina	Sept. 24-26	Buenos Aires, Argentina	A. C. Guevara Secy.	959 Junin, Buenos Aires, Argentina
Canadian Dental Association	Sept. 23-26	Ottawa, Ontario	D. W. Gullett Secy.	234 St. George St., Toronto 5, Ontario, Canada
Chicago Dental Society	Feb. 4-7, 1952	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Eleventh International Dental Conference	July 19-26, 1952	London, England	D. Downton Hon. Secy.	13 Hill Street, London W.1., England
Great Lakes Society of Orthodontists	Nov. 5-7	Cleveland	C. R. Anderson Secy.	402 Loraine Bldg., Grand Rapids, Mich.
Greater New York Dental Meeting	Dec. 3-7	New York	S. G. Standard Gen. Chm.	Room 106A, Statler Hotel, New York 1
Journees Dentaires de Paris, International Congress	Nov. 21-25	Paris, France	R. Rolland Secy. Gen.	15, Boulevard Malesherbes, Paris VIII, France
Midcontinent Dental Congress	Nov. 25-28	St. Louis	J. E. Brophy Exec. Secy.	927 Syndicate Trust Bldg., St. Louis 1
National Dental Association	Aug. 13-17	Memphis, Tenn.	J. A. Jackson Secy.	P. O. Box 197, Charlottesville, Va.
New England Dental Society	Sept. 26, 27	Boston	A. R. Wilson Secy.	43 Farmington Ave., Hartford 5, Conn.
New Orleans Dental Conference	Nov. 11-14	New Orleans	M. R. Matta Secy.	629 Maison Blanche Bldg., New Orleans
Southern Society of Orthodontists	July 31-Aug. 2	White Sulphur Springs, W. Va.	F. P. Bowyer Secy.	608 Medical Arts Bldg., Knoxville, Tenn.
Twelfth Congress of French Stomatology	Oct.	Paris, France	P. Friez Secy.	42 Rue Notre-Dame-des-Champs, Paris VI, France

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MINNESOTA—Very modern, attractive and complete dental office in wealthy residential suburb of Minneapolis. Rapidly expanding, residentially and commercially. Leaving because of health. Address A.D.A. Box 54.

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VIRGINIA—Dental office or equipment at Virginia Beach. One operating room; completely Ritter equipped. Direct replies to Lt. jg. John R. Anderson, Dental Dispensary, Parris Island, S.C.

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(b) Dentists experienced in teaching for following departments: (1) crown and bridge, (2) oral diagnosis, (3) children's dentistry, (4) other departments in clinical dentistry.

●

(c) Dentist experienced in exodontia and oral surgery; college town, Illinois; $10,000.

●

(d) Dentist trained in biochemistry or chemistry research; department, university dental school.

●

(e) Dentist licensed Vermont; group appointment.

●

(f) Oral surgeon to become associated with oral surgeon; California.

●

(g) Pedodontist; association, private practice; Detroit.

●

(h) Associate; general practice; emphasis on periodontia; Illinois.

●

(i) Dentist for full time institutional position; arrangements for license; Pacific Northwest.

●

(j) Assistant; general practice dentistry; Chicago area.

●

(k) Dentist for group practice; Baltimore area.

●

(l) Director, dental health program.

(m) General dentist to join dental department, 22-man clinic; Winter resort area, Southwest.

●

(n) Associate, general practice; minimum $500; early partnership; South Dakota.

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(b) PEDODONTIST; year's graduate training Rochester Dental Clinic; several years' private practice.

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(c) ORAL SURGEON; B.A., D.D.S., M.S. (Oral Surgery); several years' successful general practice before specializing; eligible for American Board.

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(d) ORTHODONTIST; D.D.S. Northwestern; recently completed graduate training orthodontia for which he received M.S. degree; successful general practice before specializing.

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(e) DENTIST now specializing in periodontia; eighteen months' graduate training in periodontia; teaching and administrative experience; in early thirties.

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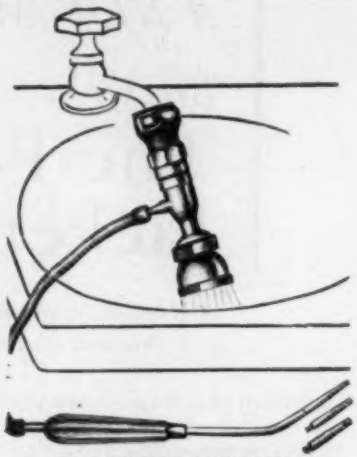

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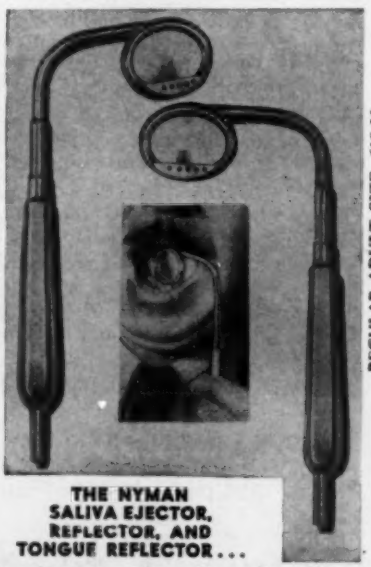

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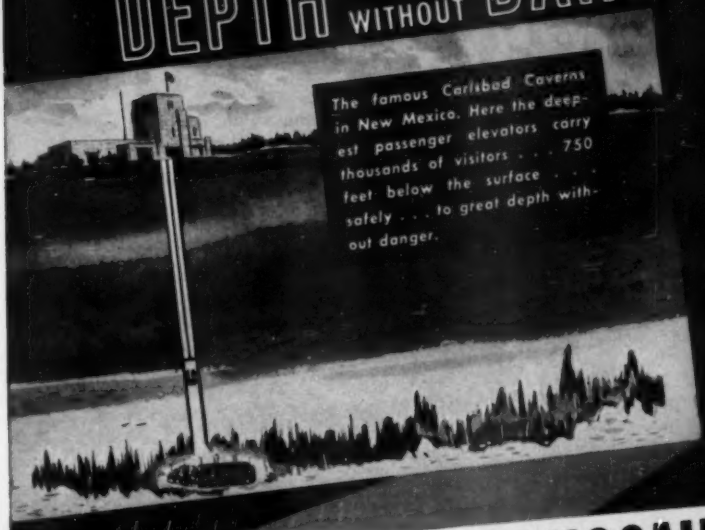
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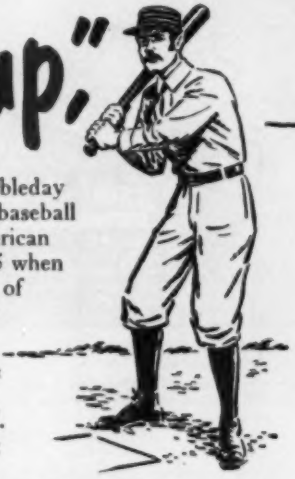

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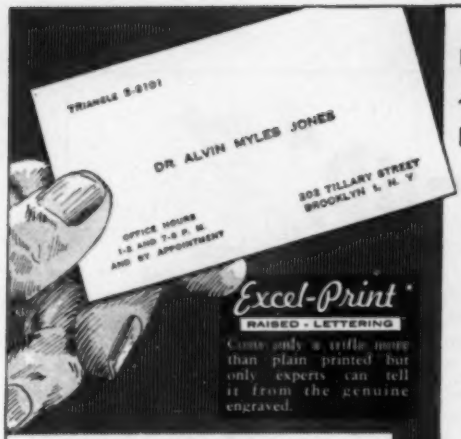
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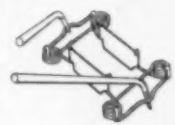

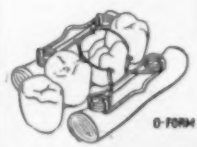

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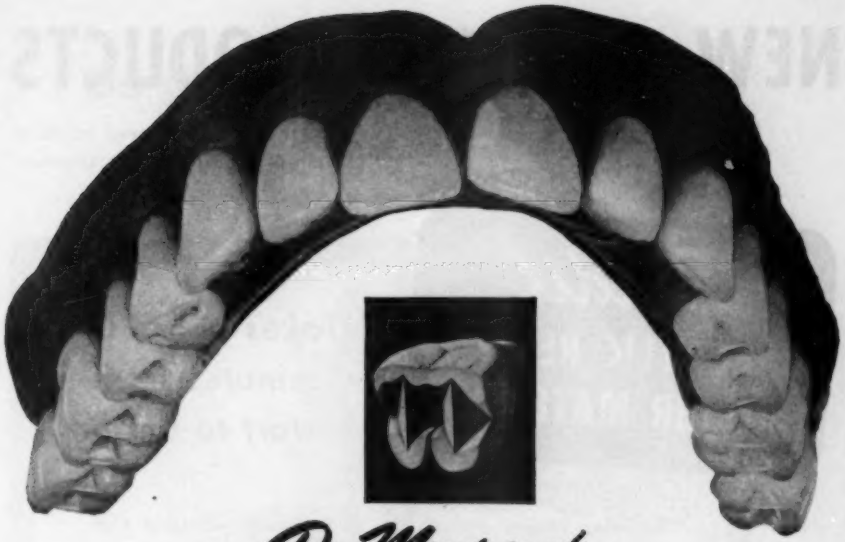

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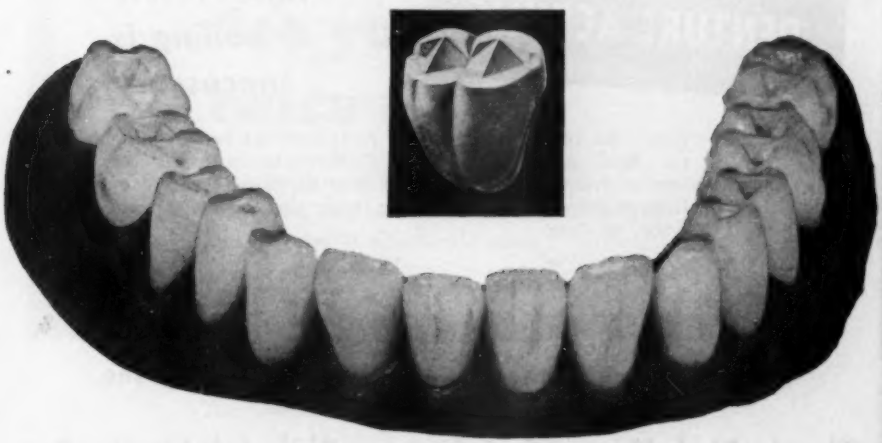

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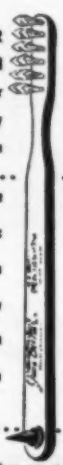

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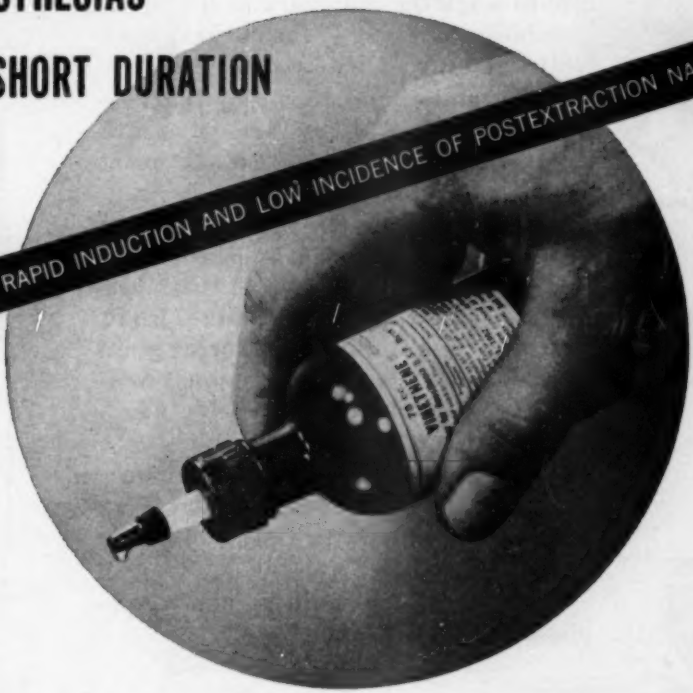

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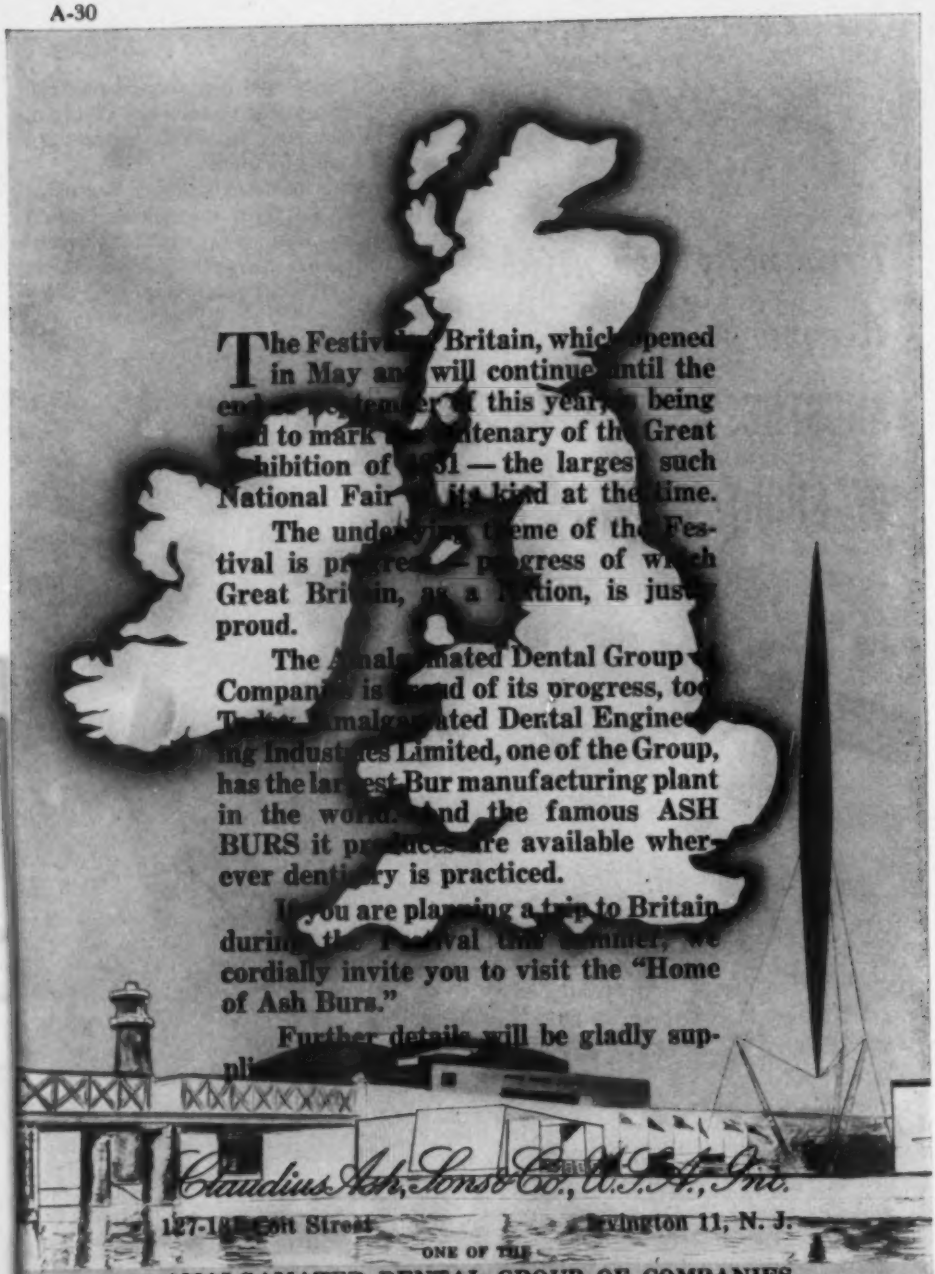

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Give faster pain relief with BUFFERIN

ACTS TWICE AS FAST AS ASPIRIN

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1. BUFFERIN enters the stomach here.

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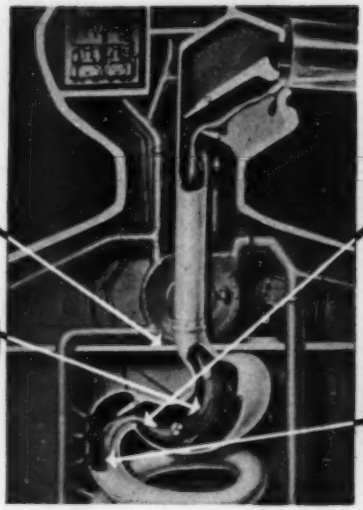

3. BUFFERIN helps dilate the pyloric valve, promptly leaves the stomach.

4. BUFFERIN'S analgesic component is absorbed into the blood *twice as fast as aspirin*, relieves pain.

When you prescribe BUFFERIN to your patients you assure *faster relief of pain*. Clinical studies[1] show that within ten minutes after BUFFERIN is ingested, blood salicylate levels are as great as those attained by aspirin in twice this time. That is why BUFFERIN *acts twice as fast as aspirin.*

BUFFERIN has *greater gastric tolerance.* BUFFERIN's antacid ingredients provide protection against the gastric distress so often seen with aspirin.[1] BUFFERIN, therefore, is especially suited for use when prolonged use of salicylates is indicated.

1. Effect of Buffering Agents on Absorption of Acetylsalicylic Acid. J. Am. Pharm. A., Sc. Ed. 39:21, Jan. 1950.

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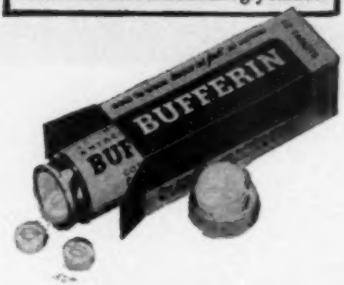

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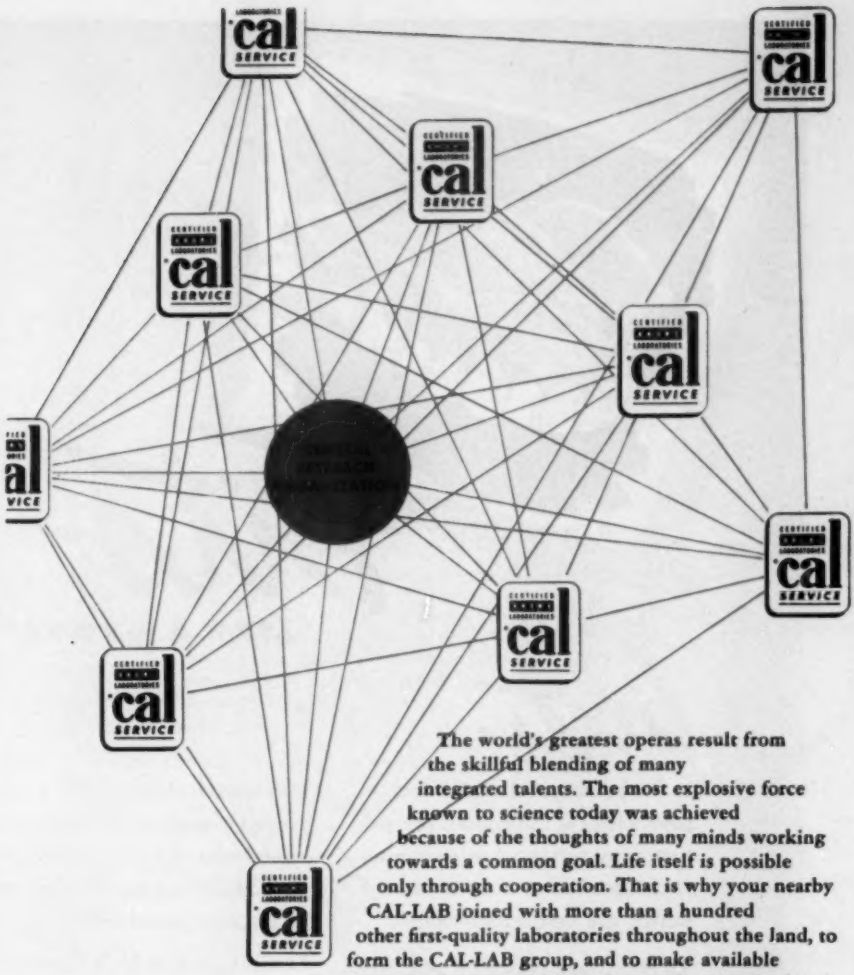

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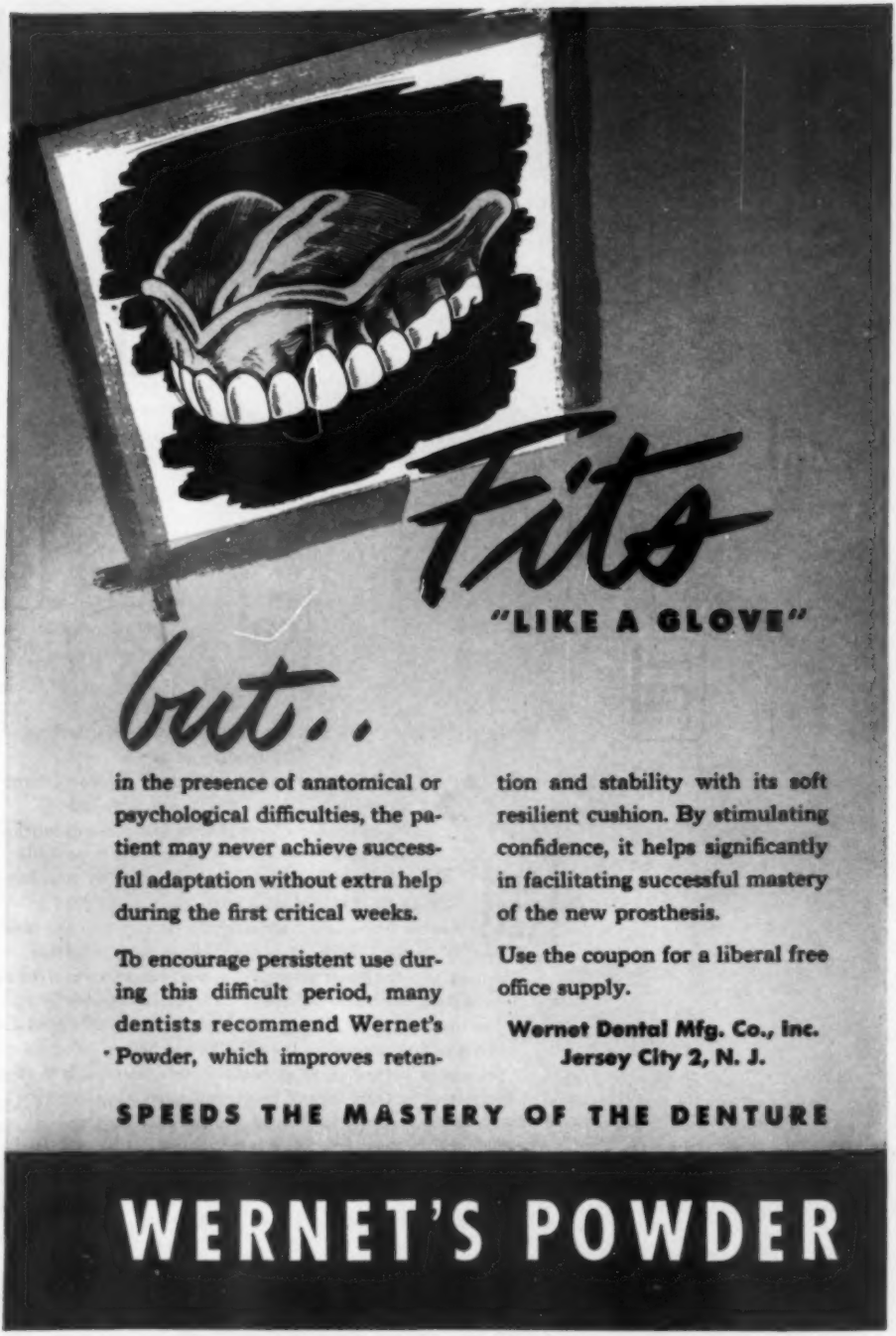
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WERNET DENTAL LORE

JULY 1951

Women are not new in dentistry! The first woman to practice dentistry in this country is thought to be Dr. Emeline R. Jones, who became her dentist-husband's assistant in 1855. The first woman to graduate from a dental school was Lucy Taylor, who won her degree from the Ohio Dental College in 1866. Yet, even today, there are some dental schools who bar female students, although the Army is appointing women dentists to its reserve.

• • •

Tests change with the times. This year, all but one of the nation's dental schools will-employ a special aptitude test devised by the ADA's Council on Dental Education, to help select 3,150 students out of the estimated 12,000 who will be applying for admission in the fall of 1951.

• • •

The alertness of the American public to new scientific developments is indicated by the fact that, in the past two years, 45% of the families in U. S. bought ammoniated dentifrices, whose use increased over 35% in 1950 over 1949.

• • •

It's no subversive observation to note that (dentally speaking) George Washington's bark was often worse than his "bite," since he was notoriously careless with his "store teeth." In fact, John Greenwood, pioneer American dentist, had to make six sets for him between 1789 and 1798, four complete and two partial dentures.

• • •

Contrary to the impression still prevailing in some professional quarters, the use of gum arabic or gum tragacanth in the formulation of a denture adhesive such as Wernet's Powder, has long been superseded by the use of gum karaya, because of the more ready solubility of the latter, and its softer effect when applied to the tissues.

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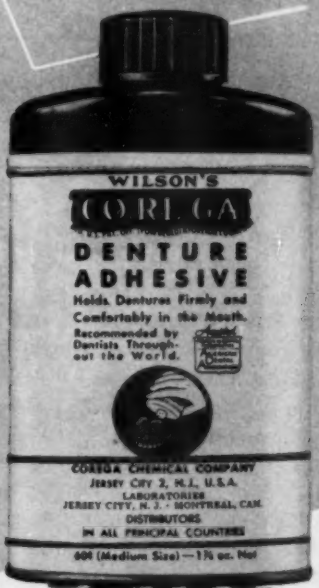

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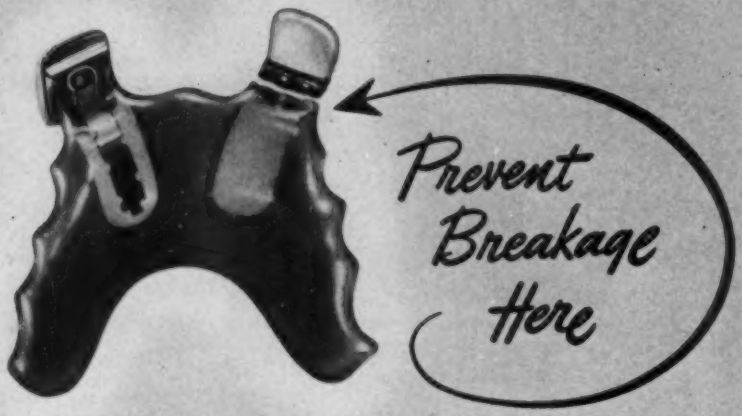
. . . In plastic partial dentures with one or more *isolated* teeth



In partial dentures of this type the thin, narrow area of vulcanite or acrylic material supporting one or more teeth is a critical area—usually lacking in strength and rigidity. The logical engineering solution is to span this area with *embedded metal reinforcing*—just as concrete structures are reinforced with steel rods.

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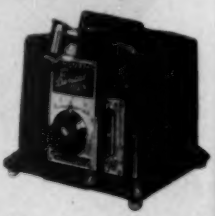

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Regular brushing of the teeth with Kolynos, after eating, helps protect your patients against tooth decay. No tooth paste, ammoniated or not, has been clinically proved more effective than Kolynos in the prevention of tooth decay. The foamy, active bubbles in Kolynos help dislodge tiny food particles from between the teeth. Kolynos' cleansing agents help loosen and remove harmful dental plaques which might otherwise lead to tooth decay. We make no wild claims for Kolynos, but we do say there is no better tooth paste made for prevention of tooth decay. May we suggest that you recommend Kolynos to your patients?

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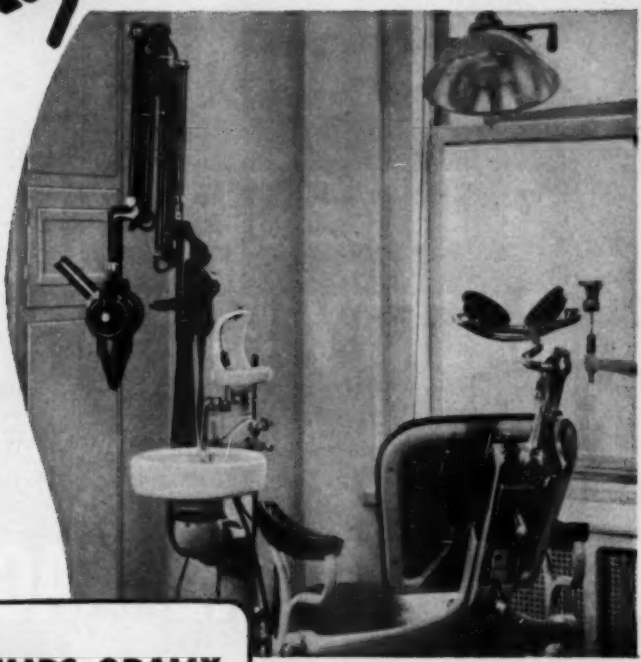

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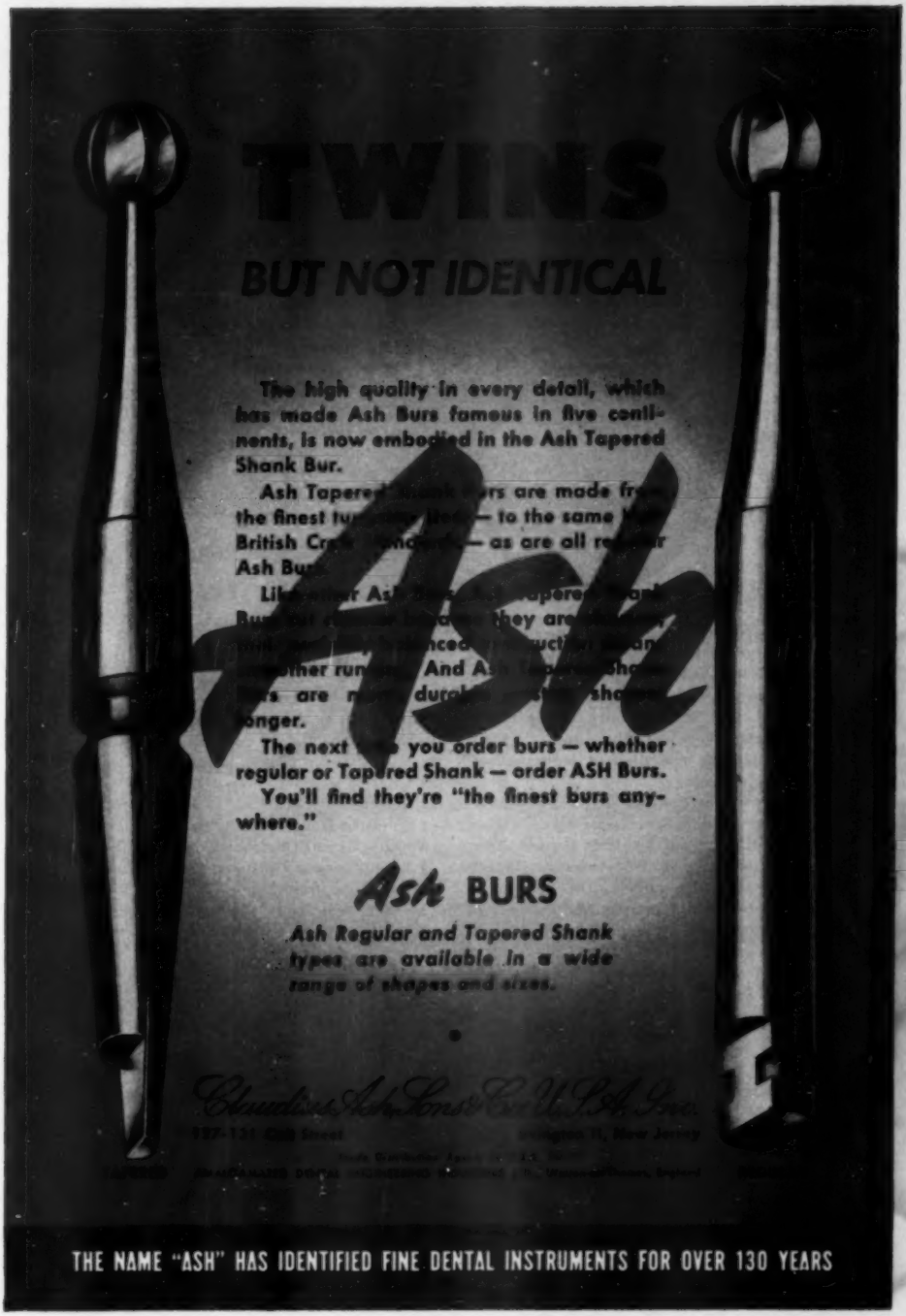
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Reservations for hotel accommodations may be secured by completing this application and mailing it to: *A.D.A. Housing Bureau,* 204 Star Building, Washington 4, D. C. List four choices of hotels. You will receive confirmation direct from the hotel accepting the reservation. If any difficulty arises with the reservation, write immediately to the A.D.A. Housing Bureau in Washington.

(Please print or type) A.D.A.

Applicant:

Name_____

_____
(Street address) (City) (Zone) (State)

Arrival in Washington_____ a.m. p.m. Leaving_____

Accommodations:

Hotel_____ Hotel_____
(First choice) (Third choice)

Hotel_____ Hotel_____
(Second choice) (Fourth choice)

☐ Single occupancy, rate to range from $_____ to $_____ per day.

☐ Double occupancy, double bed, rate to range from $_____ to $_____ per day.

☐ Double occupancy, twin beds, rate to range from $_____ to $_____ per day.

☐ Suite of_____ rooms, including parlor, rate to range from $_____ to $_____ per day.

Occupants: (use extra sheets for additional rooms)

Rooms will be occupied by:

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(Name) (Address) (City) (State)

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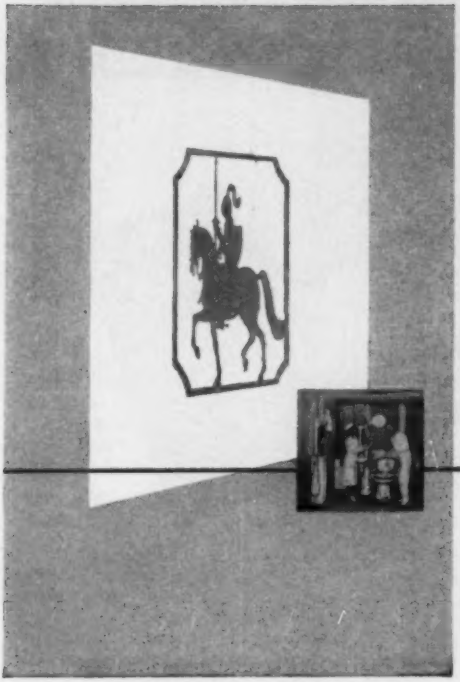
1. *J.A.D.A.* 42:449 (April) 1951



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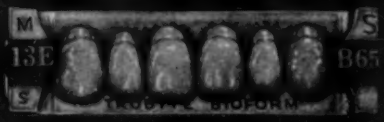

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